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Principles of Economics 3e.

Money and Banking

27

FIGURE 27.1 Cowrie Shell or Money? Is this an image of a cowrie shell or money? The answer is: Both. For centuries, people used the extremely durable cowrie shell as a medium of exchange in various parts of the world. (Credit: modification of "Cowry Shell (Cypraeidae)" by Silke Baron/Flickr Creative Commons, CC BY 2.0)

CHAPTER OBJECTIVES

In this chapter, you will learn about:

- Defining Money by Its Functions
- Measuring Money: Currency, M1, and M2
- The Role of Banks
- How Banks Create Money

Introduction to Money and Banking

BRING IT HOME

The Many Disguises of Money: From Cowries to Crypto

Here is a trivia question: In the history of the world, what item did people use for money over the broadest geographic area and for the longest period of time? The answer is not gold, silver, or any precious metal. It is the cowrie, a mollusk shell found mainly off the Maldives Islands in the Indian Ocean. Cowries served as money as early as 700 B.C. in China. By the 1500s, they were in widespread use across India and Africa. For several centuries after that, cowries were the means for exchange in markets including southern Europe, western Africa, India, and China: everything from buying lunch or a ferry ride to paying for a shipload of silk or rice. Cowries were still acceptable as a

way of paying taxes in certain African nations in the early twentieth century.

What made cowries work so well as money? First, they are extremely durable—lasting a century or more. As the late economic historian Karl Polyani put it, they can be "poured, sacked, shoveled, hoarded in heaps" while remaining "clean, dainty, stainless, polished, and milk-white." Second, parties could use cowries either by counting shells of a certain size, or—for large purchases—by measuring the weight or volume of the total shells they would exchange. Third, it was impossible to counterfeit a cowrie shell, but dishonest people could counterfeit gold or silver coins by making copies with cheaper metals. Finally, in the heyday of cowrie money, from the 1500s into the 1800s, governments, first the Portuguese, then the Dutch and English, tightly controlled collecting cowries. As a result, the supply of cowries grew quickly enough to serve the needs of commerce, but not so quickly that they were no longer scarce. Money throughout the ages has taken many different forms and continues to evolve even today with the advent of cryptocurrency. What do you think money is?

The discussion of money and banking is a central component in studying macroeconomics. At this point, you should have firmly in mind the main goals of macroeconomics from Welcome to Economics!: economic growth, low unemployment, and low inflation. We have yet to discuss money and its role in helping to achieve our macroeconomic goals.

You should also understand Keynesian and neoclassical frameworks for macroeconomic analysis and how we can embody these frameworks in the aggregate demand/aggregate supply (AD/AS) model. With the goals and frameworks for macroeconomic analysis in mind, the final step is to discuss the two main categories of macroeconomic policy: monetary policy, which focuses on money, banking and interest rates; and fiscal policy, which focuses on government spending, taxes, and borrowing. This chapter discusses what economists mean by money, and how money is closely interrelated with the banking system. Monetary Policy and Bank Regulation furthers this discussion.

27.1 Defining Money by Its Functions

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Explain the various functions of money
- Contrast commodity money and fiat money

Money for the sake of money is not an end in itself. You cannot eat dollar bills or wear your bank account. Ultimately, the usefulness of money rests in exchanging it for goods or services. As the American writer and humorist Ambrose Bierce (1842–1914) wrote in 1911, money is a "blessing that is of no advantage to us excepting when we part with it." Money is what people regularly use when purchasing or selling goods and services, and thus both buyers and sellers must widely accept money. This concept of money is intentionally flexible, because money has taken a wide variety of forms in different cultures.

Barter and the Double Coincidence of Wants

To understand the usefulness of money, we must consider what the world would be like without money. How would people exchange goods and services? Economies without money typically engage in the barter system. **Barter**—literally trading one good or service for another—is highly inefficient for trying to coordinate the trades in a modern advanced economy. In an economy without money, an exchange between two people would involve a **double coincidence of wants**, a situation in which two people each want some good or service that the other person can provide. For example, if an accountant wants a pair of shoes, this accountant must find someone who has a pair of shoes in the correct size and who is willing to exchange the shoes for some hours of accounting services. Such a trade is likely to be difficult to arrange. Think about the complexity of such trades in a modern economy, with its extensive division of labor that involves thousands upon thousands of different jobs and goods.

Another problem with the barter system is that it does not allow us to easily enter into future contracts for purchasing many goods and services. For example, if the goods are perishable it may be difficult to exchange them for other goods in the future. Imagine a farmer wanting to buy a tractor in six months using a fresh crop of strawberries. Additionally, while the barter system might work adequately in small economies, it will keep these economies from growing. The time that individuals would otherwise spend producing goods and services and enjoying leisure time they spend bartering.

Functions for Money

Money solves the problems that the barter system creates. (We will get to its definition soon.) First, money serves as a **medium of exchange**, which means that money acts as an intermediary between the buyer and the seller. Instead of exchanging accounting services for shoes, the accountant now exchanges accounting services for money. The accountant then uses this money to buy shoes. To serve as a medium of exchange, people must widely accept money as a method of payment in the markets for goods, labor, and financial capital.

Second, money must serve as a **store of value**. In a barter system, we saw the example of the shoemaker trading shoes for accounting services. However, she risks having her shoes go out of style, especially if she keeps them in a warehouse for future use—their value will decrease with each season. Shoes are not a good store of value. Holding money is a much easier way of storing value. You know that you do not need to spend it immediately because it will still hold its value the next day, or the next year. This function of money does not require that money is a *perfect* store of value. In an economy with inflation, money loses some buying power each year, but it remains money.

Third, money serves as a **unit of account**, which means that it is the ruler by which we measure values. For example, an accountant may charge $100 to file your tax return. That $100 can purchase two pair of shoes at $50 a pair. Money acts as a common denominator, an accounting method that simplifies thinking about trade-offs.

Finally, another function of money is that it must serve as a **standard of deferred payment**. This means that if money is usable today to make purchases, it must also be acceptable to make purchases today that the purchaser will pay in the *future*. Loans and future agreements are stated in monetary terms and the standard of deferred payment is what allows us to buy goods and services today and pay in the future. Thus, **money** serves all of these functions— it is a medium of exchange, store of value, unit of account, and standard of deferred payment.

Commodity versus Fiat Money

Money has taken a wide variety of forms in different cultures. People have used gold, silver, cowrie shells, cigarettes, and even cocoa beans as money. Although we use these items as **commodity money**, they also have a value from use as something other than money. For example, people have used gold throughout the ages as money although today we do not use it as money but rather value it for its other attributes. Gold is a good conductor of electricity and the electronics and aerospace industry use it. Other industries use gold too, such as to manufacture energy efficient reflective glass for skyscrapers and is used in the medical industry as well. Of course, gold also has value because of its beauty and malleability in creating jewelry.

As commodity money, gold has historically served its purpose as a medium of exchange, a store of value, and as a unit of account. **Commodity-backed currencies** are dollar bills or other currencies with values backed up by gold or other commodities held at a bank. During much of its history, gold and silver backed the money supply in the United States. Interestingly, antique dollars dated as late as 1957, have “Silver Certificate” printed over the portrait of George Washington, as Figure 27.2 shows. This meant that the holder could take the bill to the appropriate bank and exchange it for a dollar’s worth of silver.

FIGURE 27.2 A Silver Certificate and a Modern U.S. Bill Until 1958, silver certificates were commodity-backed money—backed by silver, as indicated by the words "Silver Certificate" printed on the bill. Today, The Federal Reserve backs U.S. bills, but as fiat money (inconvertible paper money made legal tender by a government decree). (Credit: "One Dollar Bills" by "The.Comedian"/Flickr Creative Commons, CC BY 2.0)

As economies grew and became more global in nature, the use of commodity monies became more cumbersome. Countries moved towards the use of **fiat money**. Fiat money has no intrinsic value, but is declared by a government to be a country's legal tender. The United States' paper money, for example, carries the statement: "THIS NOTE IS LEGAL TENDER FOR ALL DEBTS, PUBLIC AND PRIVATE." In other words, by government decree, if you owe a debt, then legally speaking, you can pay that debt with the U.S. currency, even though it is not backed by a commodity. The only backing of our money is universal faith and trust that the currency has value, and nothing more.

LINK IT UP

Watch this video (http://openstax.org/l/moneyhistory) on the "History of Money."

27.2 Measuring Money: Currency, M1, and M2

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Contrast M1 money supply and M2 money supply
- Classify monies as M1 money supply or M2 money supply

Cash in your pocket certainly serves as money; however, what about checks or credit cards? Are they money, too? Rather than trying to state a single way of measuring money, economists offer broader definitions of money based on liquidity. Liquidity refers to how quickly you can use a financial asset to buy a good or service. For example, cash is very liquid. You can use your $10 bill easily to buy a hamburger at lunchtime. However, $10 that you have in your savings account is not so easy to use. You must go to the bank or ATM machine and withdraw that cash to buy your lunch. Thus, $10 in your savings account is *less* liquid.

The Federal Reserve Bank, which is the central bank of the United States, is a bank regulator and is responsible for monetary policy and defines money according to its liquidity. There are two definitions of money: M1 and M2 money supply. Historically, **M1 money supply** included those monies that are very liquid such as cash, checkable (demand) deposits, and traveler's checks, while **M2 money supply** included those monies that are less liquid in nature; M2 included M1 plus savings and time deposits, certificates of deposits, and money market funds. Beginning in May 2020, the Federal Reserve changed the definition of both M1 and

M2. The biggest change is that savings moved to be part of M1. M1 money supply now includes cash, checkable (demand) deposits, and savings. M2 money supply is now measured as M1 plus time deposits, certificates of deposits, and money market funds.

M1 money supply includes **coins and currency in circulation**—the coins and bills that circulate in an economy that the U.S. Treasury does not hold at the Federal Reserve Bank, or in bank vaults. Closely related to currency are checkable deposits, also known as **demand deposits**. These are the amounts held in checking accounts. They are called demand deposits or checkable deposits because the banking institution must give the deposit holder his money "on demand" when the customer writes a check or uses a debit card. These items together—currency, and checking accounts in banks—comprise the definition of money known as M1, which the Federal Reserve System measures daily.

As mentioned, M1 now includes **savings deposits** in banks, which are bank accounts on which you cannot write a check directly, but from which you can easily withdraw the money at an automatic teller machine or bank.

A broader definition of money, M2 includes everything in M1 but also adds other types of deposits. Many banks and other financial institutions also offer a chance to invest in **money market funds**, where they pool together the deposits of many individual investors and invest them in a safe way, such as short-term government bonds. Another ingredient of M2 are the relatively small (that is, less than about $100,000) certificates of deposit (CDs) or **time deposits**, which are accounts that the depositor has committed to leaving in the bank for a certain period of time, ranging from a few months to a few years, in exchange for a higher interest rate. In short, all these types of M2 are money that you can withdraw and spend, but which require a greater effort to do so than the items in M1. Figure 27.3 should help in visualizing the relationship between M1 and M2. Note that M1 is included in the M2 calculation.

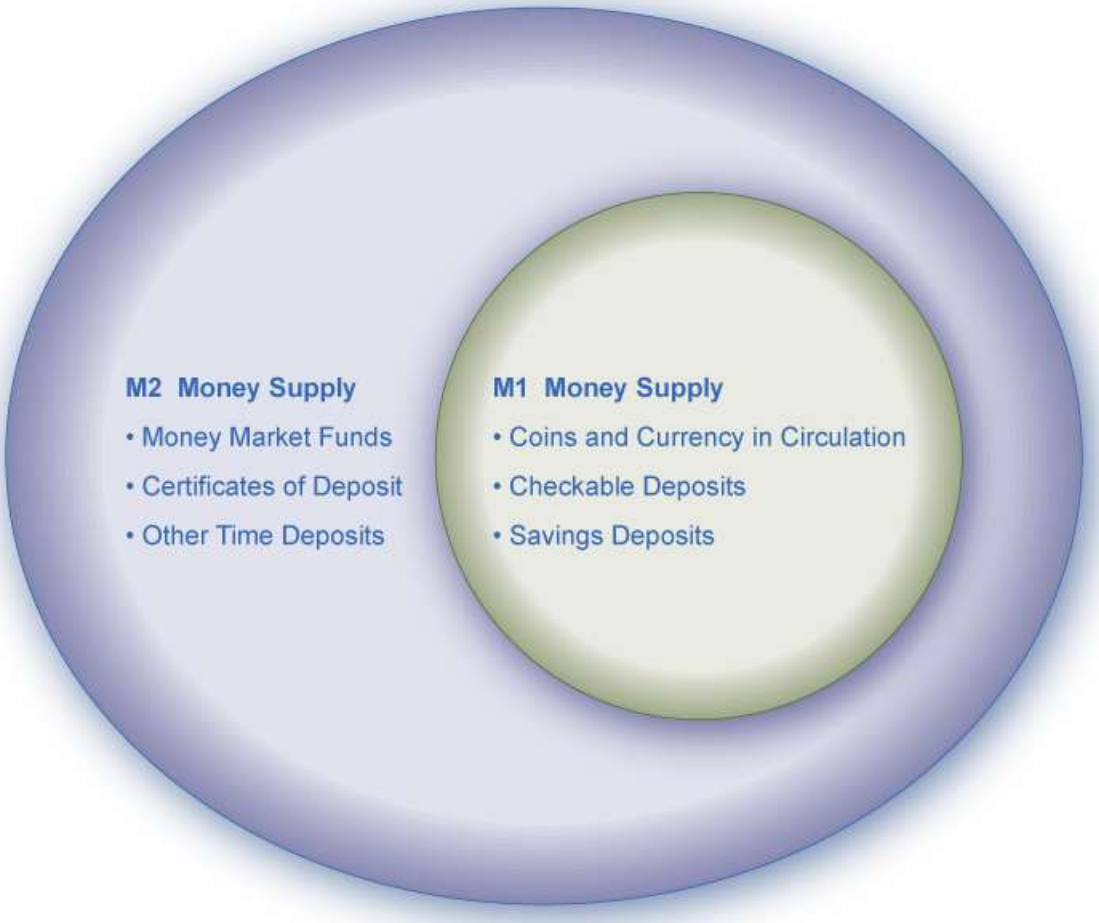

FIGURE 27.3 The Relationship between M1 and M2 Money M1 and M2 money have several definitions, ranging from narrow to broad. M1 = coins and currency in circulation + checkable (demand) deposit + savings deposits. M2 = M1 + money market funds + certificates of deposit + other time deposits.

The Federal Reserve System is responsible for tracking the amounts of M1 and M2 and prepares a weekly release of information about the money supply. To provide an idea of what these amounts sound like, according to the Federal Reserve Bank's measure of the U.S. money stock, at the end of November 2021, M1 in the United States was $20.3 trillion, while M2 was $21.4 trillion. Table 27.1 provides a breakdown of the portion of each type of money that comprised M1 and M2 in November 2021, as provided by the Federal Reserve Bank.

Components of M1 in the U.S. (November 2021, Seasonally Adjusted)	**$ billions**
Currency	$2,114.6
Demand deposits	$4,764.1
Savings and other liquid deposits	$13,466.3
Total M1	*$20,345 (or $21.4 trillion)*

TABLE 27.1 M1 and M2 Federal Reserve Statistical Release, Money Stock Measures (Source: Federal Reserve Statistical Release, http://www.federalreserve.gov/RELEASES/h6/current/default.htm#t2tg1link)

Components of M2 in the U.S. (November 2021, Seasonally Adjusted)	$ billions
M1 money supply	$19,221
Small-denomination time deposits	$120
Retail money market fund balances	$1,027
Total M2	*$20,368 (or $20 trillion)*

TABLE 27.1 M1 and M2 Federal Reserve Statistical Release, Money Stock Measures (Source: Federal Reserve Statistical Release, http://www.federalreserve.gov/RELEASES/h6/current/default.htm#t2tg1link)

The lines separating M1 and M2 can become a little blurry. Sometimes businesses do not treat elements of M1 alike. For example, some businesses will not accept personal checks for large amounts, but will accept traveler's checks or cash. Changes in banking practices and technology have made the savings accounts in M2 more similar to the checking accounts in M1. For example, some savings accounts will allow depositors to write checks, use automatic teller machines, and pay bills over the internet, which has made it easier to access savings accounts. As with many other economic terms and statistics, the important point is to know the strengths and limitations of the various definitions of money, not to believe that such definitions are as clear-cut to economists as, say, the definition of nitrogen is to chemists.

Where does "plastic money" like debit cards, credit cards, and smart money fit into this picture? A **debit card**, like a check, is an instruction to the user's bank to transfer money directly and immediately from your bank account to the seller. It is important to note that in our definition of money, it is *checkable deposits* that are money, not the paper check or the debit card. Although you can make a purchase with a **credit card**, the financial institution does not consider it money but rather a short term loan from the credit card company to you. When you make a credit card purchase, the credit card company immediately transfers money from its checking account to the seller, and at the end of the month, the credit card company sends you a bill for what you have charged that month. Until you pay the credit card bill, you have effectively borrowed money from the credit card company. With a **smart card**, you can store a certain value of money on the card and then use the card to make purchases. Some "smart cards" used for specific purposes, like long-distance phone calls or making purchases at a campus bookstore and cafeteria, are not really all that smart, because you can only use them for certain purchases or in certain places.

In short, credit cards, debit cards, and smart cards are different ways to move money when you make a purchase. However, having more credit cards or debit cards does not change the quantity of money in the economy, any more than printing more checks increases the amount of money in your checking account.

One key message underlying this discussion of M1 and M2 is that money in a modern economy is not just paper bills and coins. Instead, money is closely linked to bank accounts. The banking system largely conducts macroeconomic policies concerning money. The next section explains how banks function and how a nation's banking system has the power to create money.

LINK IT UP

Read a brief article (http://openstax.org/l/Sweden) on the monetary challenges in Sweden.

27.3 The Role of Banks

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Explain how banks act as intermediaries between savers and borrowers
- Evaluate the relationship between banks, savings and loans, and credit unions
- Analyze the causes of bankruptcy and recessions

Somebody once asked the late bank robber named Willie Sutton why he robbed banks. He answered: "That's where the money is." While this may have been true at one time, from the perspective of modern economists, Sutton is both right and wrong. He is wrong because the overwhelming majority of money in the economy is not in the form of currency sitting in vaults or drawers at banks, waiting for a robber to appear. Most money is in the form of bank accounts, which exist only as electronic records on computers. From a broader perspective, however, the bank robber was more right than he may have known. Banking is intimately interconnected with money and consequently, with the broader economy.

Banks make it far easier for a complex economy to carry out the extraordinary range of transactions that occur in goods, labor, and financial capital markets. Imagine for a moment what the economy would be like if everybody had to make all payments in cash. When shopping for a large purchase or going on vacation you might need to carry hundreds of dollars in a pocket or purse. Even small businesses would need stockpiles of cash to pay workers and to purchase supplies. A bank allows people and businesses to store this money in either a checking account or savings account, for example, and then withdraw this money as needed through the use of a direct withdrawal, writing a check, or using a debit card.

Banks are a critical intermediary in what we call the **payment system**, which helps an economy exchange goods and services for money or other financial assets. Also, those with extra money that they would like to save can store their money in a bank rather than look for an individual who is willing to borrow it from them and then repay them at a later date. Those who want to borrow money can go directly to a bank rather than trying to find someone to lend them cash. **Transaction costs** are the costs associated with finding a lender or a borrower for this money. Thus, banks lower transactions costs and act as financial intermediaries—they bring savers and borrowers together. Along with making transactions much safer and easier, banks also play a key role in creating money.

Banks as Financial Intermediaries

An "intermediary" is one who stands between two other parties. Banks are a **financial intermediary**—that is, an institution that operates between a saver who deposits money in a bank and a borrower who receives a loan from that bank. Financial intermediaries include other institutions in the financial market such as insurance companies and pension funds, but we will not include them in this discussion because they are not **depository institutions**, which are institutions that accept money *deposits* and then use these to make loans. All the deposited funds mingle in one big pool, which the financial institution then lends. Figure 27.4 illustrates the position of banks as financial intermediaries, with deposits flowing into a bank and loans flowing out. Of course, when banks make loans to firms, the banks will try to funnel financial capital to healthy businesses that have good prospects for repaying the loans, not to firms that are suffering losses and may be unable to repay.

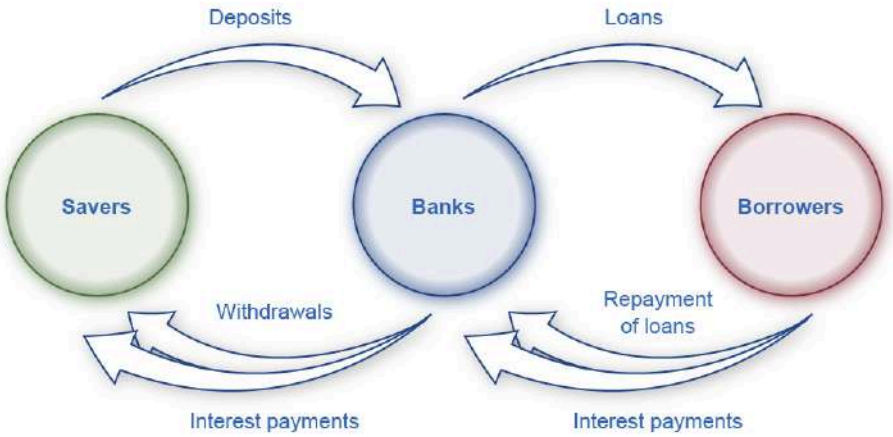

FIGURE 27.4 Banks as Financial Intermediaries Banks act as financial intermediaries because they stand between savers and borrowers. Savers place deposits with banks, and then receive interest payments and withdraw money. Borrowers receive loans from banks and repay the loans with interest. In turn, banks return money to savers in the form of withdrawals, which also include interest payments from banks to savers.

CLEAR IT UP

How are banks, savings and loans, and credit unions related?

Banks have a couple of close cousins: savings institutions and credit unions. Banks, as we explained, receive deposits from individuals and businesses and make loans with the money. Savings institutions are also sometimes called "savings and loans" or "thrifts." They also take loans and make deposits. However, from the 1930s until the 1980s, federal law limited how much interest savings institutions were allowed to pay to depositors. They were also required to make most of their loans in the form of housing-related loans, either to homebuyers or to real-estate developers and builders.

A credit union is a nonprofit financial institution that its members own and run. Members of each credit union decide who is eligible to be a member. Usually, potential members would be everyone in a certain community, or groups of employees, or members of a certain organization. The credit union accepts deposits from members and focuses on making loans back to its members. While there are more credit unions than banks and more banks than savings and loans, the total assets of credit unions are growing.

In 2008, there were 7,085 banks. Due to the bank failures of 2007–2009 and bank mergers, there were 5,571 banks in the United States at the end of the fourth quarter in 2014. By 2020, there were 4,374 commercial banks and 627 savings institutions. According to the National Credit Union Association, as of September 2021 there were 4,990 credit unions with assets totaling $2.0 trillion. A day of "Transfer Your Money" took place in 2009 out of general public disgust with big bank bailouts. People were encouraged to transfer their deposits to credit unions. This has grown into the ongoing Move Your Money Project. Consequently, some now hold assets with a total value as large as $111 billion.

A Bank's Balance Sheet

A **balance sheet** is an accounting tool that lists assets and liabilities. An **asset** is something of value that you own and you can use to produce something. For example, you can use the cash you own to pay your tuition. If you own a home, this is also an asset. A **liability** is a debt or something you owe. Many people borrow money to buy homes. In this case, a home is the asset, but the mortgage is the liability. The **net worth** is the asset value minus how much is owed (the liability). A bank's balance sheet operates in much the same way. A bank's net worth as **bank capital**. We also refer to a bank has assets such as cash held in its vaults, monies that the bank

holds at the Federal Reserve bank (called "reserves"), loans that it makes to customers, and bonds.

Figure 27.5 illustrates a hypothetical and simplified balance sheet for the Safe and Secure Bank. Because of the two-column format of the balance sheet, with the T-shape formed by the vertical line down the middle and the horizontal line under "Assets" and "Liabilities," we sometimes call it a **T-account**.

Assets		Liabilities + Net Worth	
Loans	$5 million	Deposits	$10 million
U.S. Government Securities (USGS)	$4 million		
Reserves	$2 million	Net Worth	$1 million

FIGURE 27.5 A Balance Sheet for the Safe and Secure Bank

The "T" in a T-account separates the assets of a firm, on the left, from its liabilities, on the right. All firms use T-accounts, though most are much more complex. For a bank, the assets are the financial instruments that either the bank is holding (its reserves) or those instruments where other parties owe money to the bank—like loans made by the bank and U.S. Government Securities, such as U.S. treasury bonds purchased by the bank. Liabilities are what the bank owes to others. Specifically, the bank owes any deposits made in the bank to those who have made them. The net worth of the bank is the total assets minus total liabilities. Net worth is included on the liabilities side to have the T account balance to zero. For a healthy business, net worth will be positive. For a bankrupt firm, net worth will be negative. In either case, on a bank's T-account, assets will always equal liabilities plus net worth.

When bank customers deposit money into a checking account, savings account, or a certificate of deposit, the bank views these deposits as liabilities. After all, the bank owes these deposits to its customers, when the customers wish to withdraw their money. In the example in Figure 27.5, the Safe and Secure Bank holds $10 million in deposits.

Loans are the first category of bank assets in Figure 27.5. Say that a family takes out a 30-year mortgage loan to purchase a house, which means that the borrower will repay the loan over the next 30 years. This loan is clearly an asset from the bank's perspective, because the borrower has a legal obligation to make payments to the bank over time. However, in practical terms, how can we measure the value of the mortgage loan that the borrower is paying over 30 years in the present? One way of measuring the value of something—whether a loan or anything else—is by estimating what another party in the market is willing to pay for it. Many banks issue home loans, and charge various handling and processing fees for doing so, but then sell the loans to other banks or financial institutions who collect the loan payments. We call the market where financial institutions make loans to borrowers the primary loan market, while the market in which financial institutions buy and sell these loans is the secondary loan market.

One key factor that affects what financial institutions are willing to pay for a loan, when they buy it in the secondary loan market, is the perceived riskiness of the loan: that is, given the borrower's characteristics, such as income level and whether the local economy is performing strongly, what proportion of loans of this type will the borrower repay? The greater the risk that a borrower will not repay loan, the less that any financial institution will pay to acquire the loan. Another key factor is to compare the interest rate the financial institution charged on the original loan with the current interest rate in the economy. If the original loan requires the borrower to pay a low interest rate, but current interest rates are relatively high, then a financial institution will pay less to acquire the loan. In contrast, if the original loan requires the borrower to pay a high interest rate, while current interest rates are relatively low, then a financial institution will pay more to acquire the loan. For the Safe and Secure Bank in this example, the total value of its loans if they sold them to other financial institutions in the secondary market is $5 million.

The second category of bank asset is bonds, which are a common mechanism for borrowing, used by the federal and local government, and also private companies, and nonprofit organizations. A bank takes some of the money it has received in deposits and uses the money to buy bonds—typically bonds issued that the U.S.

government issues. Government bonds are low-risk because the government is virtually certain to pay off the bond, albeit at a low rate of interest. These bonds are an asset for banks in the same way that loans are an asset: The bank will receive a stream of payments in the future. In our example, the Safe and Secure Bank holds bonds worth a total value of $4 million.

The final entry under assets is **reserves**, which is money that the bank keeps on hand, and that it does not lend or invest in bonds—and thus does not lead to interest payments. The Federal Reserve requires that banks keep a certain percentage of depositors' money on "reserve," which means either in their vaults or at the Federal Reserve Bank. We call this a reserve requirement. (Monetary Policy and Bank Regulation will explain how the level of these required reserves are one policy tool that governments have to influence bank behavior.) Additionally, banks may also want to keep a certain amount of reserves on hand in excess of what is required. The Safe and Secure Bank is holding $2 million in reserves.

We define net worth of a bank as its total assets minus its total liabilities. For the Safe and Secure Bank in Figure 27.5, net worth is equal to $1 million; that is, $11 million in assets minus $10 million in liabilities. For a financially healthy bank, the net worth will be positive. If a bank has negative net worth and depositors tried to withdraw their money, the bank would not be able to give all depositors their money.

LINK IT UP

For some concrete examples of what banks do, watch this video (http://openstax.org/l/makingsense) from Paul Solman's "Making Sense of Financial News."

How Banks Go Bankrupt

A bank that is bankrupt will have a negative net worth, meaning its assets will be worth less than its liabilities. How can this happen? Again, looking at the balance sheet helps to explain.

A well-run bank will assume that a small percentage of borrowers will not repay their loans on time, or at all, and factor these missing payments into its planning. Remember, the calculations of the banks' expenses every year include a factor for loans that borrowers do not repay, and the value of a bank's loans on its balance sheet assumes a certain level of riskiness because some customers will not repay loans. Even if a bank expects a certain number of loan defaults, it will suffer if the number of loan defaults is much greater than expected, as can happen during a recession. For example, if the Safe and Secure Bank in Figure 27.5 experienced a wave of unexpected defaults, so that its loans declined in value from $5 million to $3 million, then the assets of the Safe and Secure Bank would decline so that the bank had negative net worth.

CLEAR IT UP

What led to the 2008–2009 financial crisis?

Many banks make mortgage loans so that people can buy a home, but then do not keep the loans on their books as an asset. Instead, the bank sells the loan. These loans are "securitized," which means that they are bundled together into a financial security that a financial institution sells to investors. Investors in these mortgage-backed securities receive a rate of return based on the level of payments that people make on all the mortgages that stand behind the security.

Securitization offers certain advantages. If a bank makes most of its loans in a local area, then the bank may be financially vulnerable if the local economy declines, so that many people are unable to make their payments. However, if a bank sells its local loans, and then buys a mortgage-backed security based on home loans in many parts of the country, it can avoid exposure to local financial risks. (In the simple example in the text, banks just own "bonds." In reality, banks can own a number of financial instruments, as long as these financial investments are safe enough to satisfy the government bank regulators.) From the standpoint of a local homebuyer, securitization offers

the benefit that a local bank does not need to have significant extra funds to make a loan, because the bank is only planning to hold that loan for a short time, before selling the loan so that it can pool it into a financial security.

However, securitization also offers one potentially large disadvantage. If a bank plans to hold a mortgage loan as an asset, the bank has an incentive to scrutinize the borrower carefully to ensure that the customer is likely to repay the loan. However, a bank that plans to sell the loan may be less careful in making the loan in the first place. The bank will be more willing to make what we call "subprime loans," which are loans that have characteristics like low or zero down-payment, little scrutiny of whether the borrower has a reliable income, and sometimes low payments for the first year or two that will be followed by much higher payments. Economists dubbed some of the subprime loans made by financial institutions in the mid-2000s NINJA loans: loans that financial institutions made even though the borrower had demonstrated No Income, No Job, or Assets.

Financial institutions typically sold these subprime loans and turned them into financial securities—but with a twist. The idea was that if losses occurred on these mortgage-backed securities, certain investors would agree to take the first, say, 5% of such losses. Other investors would agree to take, say, the next 5% of losses. By this approach, still other investors would not need to take any losses unless these mortgage-backed financial securities lost 25% or 30% or more of their total value. These complex securities, along with other economic factors, encouraged a large expansion of subprime loans in the mid-2000s.

The economic stage was now set for a banking crisis. Banks thought they were buying only ultra-safe securities, because even though the securities were ultimately backed by risky subprime mortgages, the banks only invested in the part of those securities where they were protected from small or moderate levels of losses. However, as housing prices fell after 2007, and the deepening recession made it harder for many people to make their mortgage payments, many banks found that their mortgage-backed financial assets could be worth much less than they had expected—and so the banks were faced with staring bankruptcy. In the 2008–2011 period, 318 banks failed in the United States.

The risk of an unexpectedly high level of loan defaults can be especially difficult for banks because a bank's liabilities, namely it customers' deposits. Customers can withdraw funds quickly but many of the bank's assets like loans and bonds will only be repaid over years or even decades. This **asset-liability time mismatch**—the ability for customers to withdraw bank's liabilities in the short term while customers repay its assets in the long term—can cause severe problems for a bank. For example, imagine a bank that has loaned a substantial amount of money at a certain interest rate, but then sees interest rates rise substantially. The bank can find itself in a precarious situation. If it does not raise the interest rate it pays to depositors, then deposits will flow to other institutions that offer the higher interest rates that are now prevailing. However, if the bank raises the interest rates that it pays to depositors, it may end up in a situation where it is paying a higher interest rate to depositors than it is collecting from those past loans that it at lower interest rates. Clearly, the bank cannot survive in the long term if it is paying out more in interest to depositors than it is receiving from borrowers.

How can banks protect themselves against an unexpectedly high rate of loan defaults and against the risk of an asset-liability time mismatch? One strategy is for a bank to **diversify** its loans, which means lending to a variety of customers. For example, suppose a bank specialized in lending to a niche market—say, making a high proportion of its loans to construction companies that build offices in one downtown area. If that one area suffers an unexpected economic downturn, the bank will suffer large losses. However, if a bank loans both to consumers who are buying homes and cars and also to a wide range of firms in many industries and geographic areas, the bank is less exposed to risk. When a bank diversifies its loans, those categories of borrowers who have an unexpectedly large number of defaults will tend to be balanced out, according to random chance, by other borrowers who have an unexpectedly low number of defaults. Thus, diversification of loans can help banks to keep a positive net worth. However, if a widespread recession occurs that touches many industries and geographic areas, diversification will not help.

Along with diversifying their loans, banks have several other strategies to reduce the risk of an unexpectedly

large number of loan defaults. For example, banks can sell some of the loans they make in the secondary loan market, as we described earlier, and instead hold a greater share of assets in the form of government bonds or reserves. Nevertheless, in a lengthy recession, most banks will see their net worth decline because customers will not repay a higher share of loans in tough economic times.

27.4 How Banks Create Money

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Utilize the money multiplier formulate to determine how banks create money
- Analyze and create T-account balance sheets
- Evaluate the risks and benefits of money and banks

Banks and money are intertwined. It is not just that most money is in the form of bank accounts. The banking system can literally create money through the process of making loans. Let's see how.

Money Creation by a Single Bank

Start with a hypothetical bank called Singleton Bank. The bank has $10 million in deposits. The T-account balance sheet for Singleton Bank, when it holds all of the deposits in its vaults, is in Figure 27.6. At this stage, Singleton Bank is simply storing money for depositors and is using these deposits to make loans. In this simplified example, Singleton Bank cannot earn any interest income from these loans and cannot pay its depositors an interest rate either.

Assets		Liabilities + Net Worth	
Reserves	$10 million	Deposits	$10 million

FIGURE 27.6 Singleton Bank's Balance Sheet: Receives $10 million in Deposits

The Federal Reserve requires Singleton Bank to keep $1 million on reserve (10% of total deposits). It will loan out the remaining $9 million. By loaning out the $9 million and charging interest, it will be able to make interest payments to depositors and earn interest income for Singleton Bank (for now, we will keep it simple and not put interest income on the balance sheet). Instead of becoming just a storage place for deposits, Singleton Bank can become a financial intermediary between savers and borrowers.

This change in business plan alters Singleton Bank's balance sheet, as Figure 27.7 shows. Singleton's assets have changed. It now has $1 million in reserves and a loan to Hank's Auto Supply of $9 million. The bank still has $10 million in deposits.

Assets		Liabilities + Net Worth	
Reserves	$1 million	Deposits	$10 million
Loan to Hank's Auto Supply	$9 million		

FIGURE 27.7 Singleton Bank's Balance Sheet: 10% Reserves, One Round of Loans

Singleton Bank lends $9 million to Hank's Auto Supply. The bank records this loan by making an entry on the balance sheet to indicate that it has made a loan. This loan is an asset, because it will generate interest income for the bank. Of course, the loan officer will not allow let Hank to walk out of the bank with $9 million in cash. The bank issues Hank's Auto Supply a cashier's check for the $9 million. Hank deposits the loan in his regular checking account with First National. The deposits at First National rise by $9 million and its reserves also rise by $9 million, as Figure 27.8 shows. First National must hold 10% of additional deposits as required reserves but is free to loan out the rest

Assets		Liabilities + Net Worth	
Reserves	+ $9 million	Deposits	+ $9 million

FIGURE 27.8 First National Balance Sheet

Making loans that are deposited into a demand deposit account increases the M1 money supply. Remember the definition of M1 includes checkable (demand) deposits, which one can easily use as a medium of exchange to buy goods and services. Notice that the money supply is now $19 million: $10 million in deposits in Singleton bank and $9 million in deposits at First National. Obviously as Hank's Auto Supply writes checks to pay its bills the deposits will draw down. However, the bigger picture is that a bank must hold enough money in reserves to meet its liabilities. The rest the bank loans out. In this example so far, bank lending has expanded the money supply by $9 million.

Now, First National must hold only 10% as required reserves ($900,000) but can lend out the other 90% ($8.1 million) in a loan to Jack's Chevy Dealership as Figure 27.9 shows.

Assets		Liabilities + Net Worth	
Reserves	$900,000	Deposits	+ $9 million
Loans	$8.1 million		

FIGURE 27.9 First National Balance Sheet

If Jack's deposits the loan in its checking account at Second National, the money supply just increased by an additional $8.1 million, as Figure 27.10 shows.

Assets		Liabilities + Net Worth	
Reserves	+ $8.1 million	Deposits	+ $8.1 million

FIGURE 27.10 Second National Bank's Balance Sheet

How is this money creation possible? It is possible because there are multiple banks in the financial system, they are required to hold only a fraction of their deposits, and loans end up deposited in other banks, which increases deposits and, in essence, the money supply.

LINK IT UP

Watch this video (http://openstax.org/l/createmoney) to learn more about how banks create money.

The Money Multiplier and a Multi-Bank System

In a system with multiple banks, Singleton Bank deposited the initial excess reserve amount that it decided to lend to Hank's Auto Supply into First National Bank, which is free to loan out $8.1 million. If all banks loan out their excess reserves, the money supply will expand. In a multi-bank system, institutions determine the amount of money that the system can create by using the money multiplier. This tells us by how many times a loan will be "multiplied" as it is spent in the economy and then re-deposited in other banks.

Fortunately, a formula exists for calculating the total of these many rounds of lending in a banking system. The **money multiplier formula** is:

$$\frac{1}{\text{Reserve Requirement}}$$

We then multiply the money multiplier by the change in excess reserves to determine the total amount of M1 money supply created in the banking system. See the Work it Out feature to walk through the multiplier calculation.

WORK IT OUT

Using the Money Multiplier Formula

Using the money multiplier for the example in this text:

Step 1. In the case of Singleton Bank, for whom the reserve requirement is 10% (or 0.10), the money multiplier is 1 divided by .10, which is equal to 10.

Step 2. We have identified that the excess reserves are $9 million, so, using the formula we can determine the total change in the M1 money supply:

$$\begin{aligned}\text{Total Change in the M1 Money Supply} &= \frac{1}{\text{Reserve Requirement}} \times \text{Excess Requirement} \\ &= \frac{1}{0.10} \times \$9 \text{ million} \\ &= 10 \times \$9 \text{ million} \\ &= \$90 \text{ million}\end{aligned}$$

Step 3. Thus, we can say that, in this example, the total quantity of money generated in this economy after all rounds of lending are completed will be $90 million.

Cautions about the Money Multiplier

The money multiplier will depend on the proportion of reserves that the Federal Reserve Band requires banks to hold. Additionally, a bank can also choose to hold extra reserves. Banks may decide to vary how much they hold in reserves for two reasons: macroeconomic conditions and government rules. When an economy is in recession, banks are likely to hold a higher proportion of reserves because they fear that customers are less likely to repay loans when the economy is slow. The Federal Reserve may also raise or lower the required reserves held by banks as a policy move to affect the quantity of money in an economy, as Monetary Policy and Bank Regulation will discuss.

The process of how banks create money shows how the quantity of money in an economy is closely linked to the quantity of lending or credit in the economy. All the money in the economy, except for the original reserves, is a result of bank loans that institutions repeatedly re-deposit and loan.

Finally, the money multiplier depends on people re-depositing the money that they receive in the banking system. If people instead store their cash in safe-deposit boxes or in shoeboxes hidden in their closets, then banks cannot recirculate the money in the form of loans. Central banks have an incentive to assure that bank deposits are safe because if people worry that they may lose their bank deposits, they may start holding more money in cash, instead of depositing it in banks, and the quantity of loans in an economy will decline. Low-income countries have what economists sometimes refer to as "mattress savings," or money that people are hiding in their homes because they do not trust banks. When mattress savings in an economy are substantial, banks cannot lend out those funds and the money multiplier cannot operate as effectively. The overall quantity of money and loans in such an economy will decline.

LINK IT UP

Watch a video (http://openstax.org/l/moneymyth) of Jem Bendell discussing "The Money Myth."

Money and Banks—Benefits and Dangers

Money and banks are marvelous social inventions that help a modern economy to function. Compared with the alternative of barter, money makes market exchanges vastly easier in goods, labor, and financial markets. Banking makes money still more effective in facilitating exchanges in goods and labor markets. Moreover, the

process of banks making loans in financial capital markets is intimately tied to the creation of money.

However, the extraordinary economic gains that are possible through money and banking also suggest some possible corresponding dangers. If banks are not working well, it sets off a decline in convenience and safety of transactions throughout the economy. If the banks are under financial stress, because of a widespread decline in the value of their assets, loans may become far less available, which can deal a crushing blow to sectors of the economy that depend on borrowed money like business investment, home construction, and car manufacturing. The 2008–2009 Great Recession illustrated this pattern.

BRING IT HOME

The Many Disguises of Money: From Cowries to Crypto

The global economy has come a long way since it started using cowrie shells as currency. We have moved away from commodity and commodity-backed paper money to fiat currency. As technology and global integration increases, the need for paper currency is diminishing, too. Every day, we witness the increased use of debit and credit cards.

The latest creation and a new form of money is cryptocurrency. Cryptocurrency is digital currency that is not controlled by any single entity, such as a company or country. In this sense, it is not a fiat currency because it is not issued by a central bank and is not necessarily supported by governments as legal tender. Instead, transactions and ownership are maintained in a decentralized manner, and the value (vis-à-vis, say, the U.S. dollar) is determined primarily by market forces—i.e., supply and demand. Governments can affect the value of a cryptocurrency by regulating its use within their country's boundaries, but in the end, the price of a cryptocurrency comes down to supply and demand. Cryptocurrencies have come a long way since 2009 when Bitcoin was first invented, and the recent two to three years has seen an explosion of different cryptocurrencies being used across the globe.

It is important to note that in order to be considered as money, cryptocurrency still needs to satisfy the three requirements: it needs to be valid as a store of value, it needs to be valid as a unit of account, and it must be able to be used as a medium of exchange. While the first two of these requirements can be satisfied easily by expressing the currency in terms of another, such as the U.S. dollar, and through its secure ownership rules, its use as a medium of exchange—to be used to buy and sell goods and services—is more complicated. While cryptocurrencies are used in many illicit transactions, it is less common to see them accepted as forms of payment for regular things like groceries or your rent.

Bitcoin is the most popular cryptocurrency, and thus the one most likely to be considered real money since it can be used to purchase the most goods and services. Other popular cryptocurrencies as of early 2022 (in terms of trade volume) are Ethereum and Binance Coin. Many other cryptocurrencies exist, but their more widespread adoption as a medium of exchange is yet to be seen.

Key Terms

asset item of value that a firm or an individual owns
asset–liability time mismatch customers can withdraw a bank's liabilities in the short term while customers repay its assets in the long term
balance sheet an accounting tool that lists assets and liabilities
bank capital a bank's net worth
barter literally, trading one good or service for another, without using money
coins and currency in circulation the coins and bills that circulate in an economy that are not held by the U.S Treasury, at the Federal Reserve Bank, or in bank vaults
commodity money an item that is used as money, but which also has value from its use as something other than money
commodity-backed currencies dollar bills or other currencies with values backed up by gold or another commodity
credit card immediately transfers money from the credit card company's checking account to the seller, and at the end of the month the user owes the money to the credit card company; a credit card is a short-term loan
debit card like a check, is an instruction to the user's bank to transfer money directly and immediately from your bank account to the seller
demand deposit checkable deposit in banks that is available by making a cash withdrawal or writing a check
depository institution institution that accepts money deposits and then uses these to make loans
diversify making loans or investments with a variety of firms, to reduce the risk of being adversely affected by events at one or a few firms
double coincidence of wants a situation in which two people each want some good or service that the other person can provide
fiat money has no intrinsic value, but is declared by a government to be the country's legal tender
financial intermediary an institution that operates between a saver with financial assets to invest and an entity who will borrow those assets and pay a rate of return
liability any amount or debt that a firm or an individual owes
M1 money supply a narrow definition of the money supply that includes currency and checking accounts in banks, and to a lesser degree, traveler's checks.
M2 money supply a definition of the money supply that includes everything in M1, but also adds savings deposits, money market funds, and certificates of deposit
medium of exchange whatever is widely accepted as a method of payment
money whatever serves society in four functions: as a medium of exchange, a store of value, a unit of account, and a standard of deferred payment.
money market fund the deposits of many investors are pooled together and invested in a safe way like short-term government bonds
money multiplier formula total money in the economy divided by the original quantity of money, or change in the total money in the economy divided by a change in the original quantity of money
net worth the excess of the asset value over and above the amount of the liability; total assets minus total liabilities
payment system helps an economy exchange goods and services for money or other financial assets
reserves funds that a bank keeps on hand and that it does not loan out or invest in bonds
savings deposit bank account where you cannot withdraw money by writing a check, but can withdraw the money at a bank—or can transfer it easily to a checking account
smart card stores a certain value of money on a card and then one can use the card to make purchases
standard of deferred payment money must also be acceptable to make purchases today that will be paid in the future
store of value something that serves as a way of preserving economic value that one can spend or consume in

the future

T-account a balance sheet with a two-column format, with the T-shape formed by the vertical line down the middle and the horizontal line under the column headings for “Assets” and “Liabilities”

time deposit account that the depositor has committed to leaving in the bank for a certain period of time, in exchange for a higher rate of interest; also called certificate of deposit

transaction costs the costs associated with finding a lender or a borrower for money

unit of account the common way in which we measure market values in an economy

Key Concepts and Summary

27.1 Defining Money by Its Functions

Money is what people in a society regularly use when purchasing or selling goods and services. If money were not available, people would need to barter with each other, meaning that each person would need to identify others with whom they have a double coincidence of wants—that is, each party has a specific good or service that the other desires. Money serves several functions: a medium of exchange, a unit of account, a store of value, and a standard of deferred payment. There are two types of money: commodity money, which is an item used as money, but which also has value from its use as something other than money; and fiat money, which has no intrinsic value, but is declared by a government to be the country's legal tender.

27.2 Measuring Money: Currency, M1, and M2

We measure money with several definitions: M1 includes currency and money in checking accounts (demand deposits). Traveler’s checks are also a component of M1, but are declining in use. M2 includes all of M1, plus savings deposits, time deposits like certificates of deposit, and money market funds.

27.3 The Role of Banks

Banks facilitate using money for transactions in the economy because people and firms can use bank accounts when selling or buying goods and services, when paying a worker or receiving payment, and when saving money or receiving a loan. In the financial capital market, banks are financial intermediaries; that is, they operate between savers who supply financial capital and borrowers who demand loans. A balance sheet (sometimes called a T-account) is an accounting tool which lists assets in one column and liabilities in another. The bank's liabilities are its deposits. The bank's assets include its loans, its ownership of bonds, and its reserves (which it does not loan out). We calculate a bank's net worth by subtracting its liabilities from its assets. Banks run a risk of negative net worth if the value of their assets declines. The value of assets can decline because of an unexpectedly high number of defaults on loans, or if interest rates rise and the bank suffers an asset-liability time mismatch in which the bank is receiving a low interest rate on its long-term loans but must pay the currently higher market interest rate to attract depositors. Banks can protect themselves against these risks by choosing to diversify their loans or to hold a greater proportion of their assets in bonds and reserves. If banks hold only a fraction of their deposits as reserves, then the process of banks’ lending money, re-depositing those loans in banks, and the banks making additional loans will create money in the economy.

27.4 How Banks Create Money

We define the money multiplier as the quantity of money that the banking system can generate from each $1 of bank reserves. The formula for calculating the multiplier is 1/reserve ratio, where the reserve ratio is the fraction of deposits that the bank wishes to hold as reserves. The quantity of money in an economy and the quantity of credit for loans are inextricably intertwined. The network of banks making loans, people making deposits, and banks making more loans creates much of the money in an economy.

Given the macroeconomic dangers of a malfunctioning banking system, Monetary Policy and Bank Regulation will discuss government policies for controlling the money supply and for keeping the banking system safe.

Self-Check Questions

1. In many casinos, a person buys chips to use for gambling. Within the casino's walls, customers often can use these chips to buy food and drink or even a hotel room. Do chips in a gambling casino serve all three functions of money?
2. Can you name some item that is a store of value, but does not serve the other functions of money?
3. If you are out shopping for clothes and books, what is easiest and most convenient for you to spend: M1 or M2? Explain your answer.
4. For the following list of items, indicate if they are in M1, M2, or neither:
   a. Your $5,000 line of credit on your Bank of America card
   b. $50 dollars' worth of traveler's checks you have not used yet
   c. $1 in quarters in your pocket
   d. $1200 in your checking account
   e. $2000 you have in a money market account
5. Explain why the money listed under assets on a bank balance sheet may not actually be in the bank?
6. Imagine that you are in the position of buying loans in the secondary market (that is, buying the right to collect the payments on loans) for a bank or other financial services company. Explain why you would be willing to pay more or less for a given loan if:
   a. The borrower has been late on a number of loan payments
   b. Interest rates in the economy as a whole have risen since the bank made the loan
   c. The borrower is a firm that has just declared a high level of profits
   d. Interest rates in the economy as a whole have fallen since the bank made the loan

Review Questions

7. What are the four functions that money serves?
8. How does the existence of money simplify the process of buying and selling?
9. What is the double-coincidence of wants?
10. What components of money do we count as part of M1?
11. What components of money do we count in M2?
12. Why do we call a bank a financial intermediary?
13. What does a balance sheet show?
14. What are a bank's assets? What are its liabilities?
15. How do you calculate a bank's net worth?
16. How can a bank end up with negative net worth?
17. What is the asset-liability time mismatch that all banks face?
18. What is the risk if a bank does not diversify its loans?
19. How do banks create money?
20. What is the formula for the money multiplier?

Critical Thinking Questions

21. The Bring it Home Feature discusses the use of cowrie shells as money. Although we no longer use cowrie shells as money, do you think other forms of commodity monies are possible? What role might technology play in our definition of money?

22. Imagine that you are a barber in a world without money. Explain why it would be tricky to obtain groceries, clothing, and a place to live.

23. Explain why you think the Federal Reserve Bank tracks M1 and M2.

24. The total amount of U.S. currency in circulation divided by the U.S. population comes out to about $3,500 per person. That is more than most of us carry. Where is all the cash?

25. Explain the difference between how you would characterize bank deposits and loans as assets and liabilities on your own personal balance sheet and how a bank would characterize deposits and loans as assets and liabilities on its balance sheet.

26. Should banks have to hold 100% of their deposits? Why or why not?

27. Explain what will happen to the money multiplier process if there is an increase in the reserve requirement?

28. What do you think the Federal Reserve Bank did to the reserve requirement during the 2008–2009 Great Recession?

Problems

29. If you take $100 out of your piggy bank and deposit it in your checking account, how did M1 change? Did M2 change?

30. A bank has deposits of $400. It holds reserves of $50. It has purchased government bonds worth $70. It has made loans of $500. Set up a T-account balance sheet for the bank, with assets and liabilities, and calculate the bank's net worth.

31. Humongous Bank is the only bank in the economy. The people in this economy have $20 million in money, and they deposit all their money in Humongous Bank.

a. Humongous Bank decides on a policy of holding 100% reserves. Draw a T-account for the bank.
b. Humongous Bank is required to hold 5% of its existing $20 million as reserves, and to loan out the rest. Draw a T-account for the bank after it has made its first round of loans.
c. Assume that Humongous bank is part of a multibank system. How much will money supply increase with that original $19 million loan?

Monetary Policy and Bank Regulation

28

FIGURE 28.1 Marriner S. Eccles Federal Reserve Headquarters, Washington D.C. Some of the most influential decisions regarding monetary policy in the United States are made behind these doors. (Credit: modification of work by "Marriner S. Eccles Federal Reserve" by LunchboxLarry/Flickr Creative Commons, CC BY 2.0)

CHAPTER OBJECTIVES

In this chapter, you will learn about:

- The Federal Reserve Banking System and Central Banks
- Bank Regulation
- How a Central Bank Executes Monetary Policy
- Monetary Policy and Economic Outcomes
- Pitfalls for Monetary Policy

Introduction to Monetary Policy and Bank Regulation

BRING IT HOME

The Problem of the Zero Percent Interest Rate Lower Bound

Most economists believe that monetary policy (the manipulation of interest rates and credit conditions by a nation's central bank) has a powerful influence on a nation's economy. Monetary policy works when the central bank reduces interest rates and makes credit more available. As a result, business investment and other types of spending increase, causing GDP and employment to grow.

However, what if the interest rates banks pay are close to zero already? They cannot be made negative, can they? That would mean that lenders pay borrowers for the privilege of taking their money. Yet, this was the situation the

U.S. Federal Reserve found itself in both at the end of the 2008–2009 recession and during the COVID-19 recession of 2020. The federal funds rate, which is the interest rate for banks that the Federal Reserve targets with its monetary policy, was slightly above 5% in 2007. By 2009, it had fallen to 0.16%. It then fell again from over 2% to 0.05% in March 2020.

During the Great Recession, the Federal Reserve's situation was further complicated because fiscal policy, the other major tool for managing the economy, was constrained by fears that the federal budget deficit and the public debt were already too high. What were the Federal Reserve's options? How could the Federal Reserve use monetary policy to stimulate the economy? And while fiscal policy was more aggressive in 2020, the economic situation has in some cases been more severe and additional financial support was necessary. The solution to the problem of the lower bound in both recessions, as we will see in this chapter, was to change the rules of the game.

Money, loans, and banks are all interconnected. Money is deposited in bank accounts, which is then loaned to businesses, individuals, and other banks. When the interlocking system of money, loans, and banks works well, economic transactions smoothly occur in goods and labor markets and savers are connected with borrowers. If the money and banking system does not operate smoothly, the economy can either fall into recession or suffer prolonged inflation.

The government of every country has public policies that support the system of money, loans, and banking. However, these policies do not always work perfectly. This chapter discusses how monetary policy works and what may prevent it from working perfectly.

28.1 The Federal Reserve Banking System and Central Banks

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Explain the structure and organization of the U.S. Federal Reserve
- Discuss how central banks impact monetary policy, promote financial stability, and provide banking services

In making decisions about the money supply, a central bank decides whether to raise or lower interest rates and, in this way, to influence macroeconomic policy, whose goal is low unemployment and low inflation. The central bank is also responsible for regulating all or part of the nation's banking system to protect bank depositors and insure the health of the bank's balance sheet.

We call the organization responsible for conducting monetary policy and ensuring that a nation's financial system operates smoothly the **central bank**. Most nations have central banks or currency boards. Some prominent central banks around the world include the European Central Bank, the Bank of Japan, and the Bank of England. In the United States, we call the central bank the Federal Reserve—often abbreviated as just "the Fed." This section explains the U.S. Federal Reserve's organization and identifies the major central bank's responsibilities.

Structure/Organization of the Federal Reserve

Unlike most central banks, the Federal Reserve is semi-decentralized, mixing government appointees with representation from private-sector banks. At the national level, it is run by a Board of Governors, consisting of seven members appointed by the President of the United States and confirmed by the Senate. Appointments are for 14-year terms and they are arranged so that one term expires January 31 of every even-numbered year. The purpose of the long and staggered terms is to insulate the Board of Governors as much as possible from political pressure so that governors can make policy decisions based only on their economic merits. Additionally, except when filling an unfinished term, each member only serves one term, further insulating decision-making from politics. The Fed's policy decisions do not require congressional approval, and the President cannot ask for a Federal Reserve Governor to resign as the President can with cabinet positions.

One member of the Board of Governors is designated as the Chair. For example, from 1987 until early 2006, the Chair was Alan Greenspan. From 2006 until 2014, Ben Bernanke held the post. From 2014 to 2018, Janet Yellen was the Chair. The current Chair is Jerome Powell. See the following Clear It Up feature to find out more about the former and current Chair.

CLEAR IT UP

Who has the most immediate economic power in the world?

FIGURE 28.2 Chair of the Federal Reserve Board Jerome H. Powell (Credit: "_NZ79221" by Board of Governors of the Federal Reserve System/Flickr, Public Domain)

What individual can make a financial market crash or soar just by making a public statement? It is not Bill Gates or Warren Buffett. It is not even the President of the United States. The answer is the Chair of the Federal Reserve Board of Governors. In 2018, President Donald Trump appointed Jerome H. Powell to a 4-year term as chair of the Federal Reserve, replacing Janet Yellen, who served as the first female chair of the Federal Reserve from 2014–2018 and who now serves as the Treasury Secretary in the Biden administration. In November 2021, Powell was nominated for a second term by President Biden; this appointment was confirmed in early-2022.

Powell played a pivotal role during the COVID-19 recession and its aftermath; in March 2020, under his leadership the Fed acted quickly to reduce the effective federal funds rate and expand its lending and bond-buying actions, similar to what Ben Bernanke did during the Great Recession. A centrist at heart, Powell has been criticized for fueling asset prices, even though in his many speeches and testimony before Congress he has consistently emphasized low unemployment rates and has been more tolerant of inflation than others on the Federal Reserve Board. Powell is not an academic economist by training or career—he has a J.D. from Georgetown Law and worked for many years at investment banks and on corporate boards—but this lack of "ivory tower" influences has helped guide a practical approach to economic problems, for which he is best known.

The Fed Chair is first among equals on the Board of Governors. While they have only one vote, the Chair controls the agenda, and is the Fed's public voice, so they have more power and influence than one might expect.

LINK IT UP

Visit this website (http://openstax.org/l/Governors) to see who the current members of the Federal Reserve Board of Governors are. You can follow the links provided for each board member to learn more about their backgrounds, experiences, and when their terms on the board will end.

The Federal Reserve is more than the Board of Governors. The Fed also includes 12 regional Federal Reserve

banks, each of which is responsible for supporting the commercial banks and economy generally in its district. Figure 28.3 shows the Federal Reserve districts and the cities where their regional headquarters are located. The commercial banks in each district elect a Board of Directors for each regional Federal Reserve bank, and that board chooses a president for each regional Federal Reserve district. Thus, the Federal Reserve System includes both federally and private-sector appointed leaders.

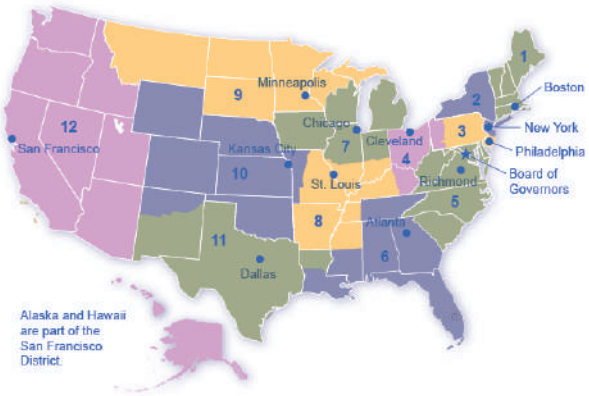

FIGURE 28.3 The Twelve Federal Reserve Districts There are twelve regional Federal Reserve banks, each with its district.

What Does a Central Bank Do?

The Federal Reserve, like most central banks, is designed to perform three important functions:

1. To conduct monetary policy
2. To promote stability of the financial system
3. To provide banking services to commercial banks and other depository institutions, and to provide banking services to the federal government.

The first two functions are sufficiently important that we will discuss them in their own modules. The third function we will discuss here.

The Federal Reserve provides many of the same services to banks as banks provide to their customers. For example, all commercial banks have an account at the Fed where they deposit reserves. Similarly, banks can obtain loans from the Fed through the "discount window" facility, which we will discuss in more detail later. The Fed is also responsible for check processing. When you write a check, for example, to buy groceries, the grocery store deposits the check in its bank account. Then, the grocery store's bank returns the physical check (or an image of that actual check) to your bank, after which it transfers funds from your bank account to the grocery store's account. The Fed is responsible for each of these actions.

On a more mundane level, the Federal Reserve ensures that enough currency and coins are circulating through the financial system to meet public demands. For example, each year the Fed increases the amount of currency available in banks around the Christmas shopping season and reduces it again in January.

Finally, the Fed is responsible for assuring that banks are in compliance with a wide variety of consumer protection laws. For example, banks are forbidden from discriminating on the basis of age, race, sex, or marital status. Banks are also required to disclose publicly information about the loans they make for buying houses and how they distribute the loans geographically, as well as by sex and race of the loan applicants.

28.2 Bank Regulation

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Discuss the relationship between bank regulation and monetary policy
- Explain bank supervision
- Explain how deposit insurance and lender of last resort are two strategies to protect against bank runs

A safe and stable national financial system is a critical concern of the Federal Reserve. The goal is not only to protect individuals' savings, but to protect the integrity of the financial system itself. This esoteric task is usually behind the scenes, but came into view during the 2008–2009 financial crisis, when for a brief period of time, critical parts of the financial system failed and firms became unable to obtain financing for ordinary parts of their business. Imagine if suddenly you were unable to access the money in your bank accounts because your checks were not accepted for payment and your debit cards were declined. This gives an idea of a failure of the payments/financial system.

Bank regulation is intended to maintain banks' solvency by avoiding excessive risk. Regulation falls into a number of categories, including reserve requirements, capital requirements, and restrictions on the types of investments banks may make. In Money and Banking, we learned that banks are required to hold a minimum percentage of their deposits on hand as reserves. "On hand" is a bit of a misnomer because, while a portion of bank reserves are held as cash in the bank, the majority are held in the bank's account at the Federal Reserve, and their purpose is to cover desired withdrawals by depositors. Another part of bank regulation is restrictions on the types of investments banks are allowed to make. Banks are permitted to make loans to businesses, individuals, and other banks. They can purchase U.S. Treasury securities but, to protect depositors, they are not permitted to invest in the stock market or other assets that are perceived as too risky.

Bank capital is the difference between a bank's assets and its liabilities. In other words, it is a bank's net worth. A bank must have positive net worth; otherwise it is insolvent or bankrupt, meaning it would not have enough assets to pay back its liabilities. Regulation requires that banks maintain a minimum net worth, usually expressed as a percent of their assets, to protect their depositors and other creditors.

LINK IT UP

Visit this website (http://openstax.org/l/bankregulation) to read the brief article, "Stop Confusing Monetary Policy and Bank Regulation."

Bank Supervision

Several government agencies monitor banks' balance sheets to make sure they have positive net worth and are not taking too high a level of risk. Within the U.S. Department of the Treasury, the Office of the Comptroller of the Currency has a national staff of bank examiners who conduct on-site reviews of the 1,500 or so of the largest national banks. The bank examiners also review any foreign banks that have branches in the United States. The Office of the Comptroller of the Currency also monitors and regulates about 800 savings and loan institutions.

The National Credit Union Administration (NCUA) supervises credit unions, which are nonprofit banks that their members run and own. There are about 5,000 credit unions in the U.S. economy today, although the typical credit union is small compared to most banks.

The Federal Reserve also has some responsibility for supervising financial institutions. For example, we call conglomerate firms that own banks and other businesses "bank holding companies." While other regulators like the Office of the Comptroller of the Currency supervises the banks, the Federal Reserve supervises the holding companies.

When bank supervision (and bank-like institutions such as savings and loans and credit unions) works well, most banks will remain financially healthy most of the time. If the bank supervisors find that a bank has low or negative net worth, or is making too high a proportion of risky loans, they can require that the bank change its behavior—or, in extreme cases, even force the bank to close or be sold to a financially healthy bank.

Bank supervision can run into both practical and political questions. The practical question is that measuring the value of a bank's assets is not always straightforward. As we discussed in Money and Banking, a bank's assets are its loans, and the value of these assets depends on estimates about the risk that customers will not repay these loans. These issues can become even more complex when a bank makes loans to banks or firms in other countries, or arranges financial deals that are much more complex than a basic loan.

The political question arises because a bank supervisor's decision to require a bank to close or to change its financial investments is often controversial, and the bank supervisor often comes under political pressure from the bank's owners and the local politicians to keep quiet and back off.

For example, many observers have pointed out that Japan's banks were in deep financial trouble through most of the 1990s; however, nothing substantial had been done about it by the early 2000s. A similar unwillingness to confront problems with struggling banks is visible across the rest of the world, in East Asia, Latin America, Eastern Europe, Russia, and elsewhere.

In the United States, the government passed laws in the 1990s requiring that bank supervisors make their findings open and public, and that they act as soon as they identify a problem. However, as many U.S. banks were staggered by the 2008-2009 recession, critics of the bank regulators asked pointed questions about why the regulators had not foreseen the banks' financial shakiness earlier, before such large losses had a chance to accumulate.

Bank Runs

Back in the nineteenth century and during the first few decades of the twentieth century (around and during the Great Depression), putting your money in a bank could be nerve-wracking. Imagine that the net worth of your bank became negative, so that the bank's assets were not enough to cover its liabilities. In this situation, whoever withdrew their deposits first received all of their money, and those who did not rush to the bank quickly enough, lost their money. We call depositors racing to the bank to withdraw their deposits, as Figure 28.4 shows a **bank run**. In the movie *It's a Wonderful Life*, the bank manager, played by Jimmy Stewart, faces a mob of worried bank depositors who want to withdraw their money, but manages to allay their fears by allowing some of them to withdraw a portion of their deposits—using the money from his own pocket that was supposed to pay for his honeymoon.

FIGURE 28.4 A Run on the Bank Bank runs during the Great Depression only served to worsen the economic

situation. (Credit: “Depression: "Runs on Banks” by National Archives and Records Administration, Public Domain)

The risk of bank runs created instability in the banking system. Even a rumor that a bank might experience negative net worth could trigger a bank run and, in a bank run, even healthy banks could be destroyed. Because a bank loans out most of the money it receives, and because it keeps only limited reserves on hand, a bank run of any size would quickly drain any of the bank’s available cash. When the bank had no cash remaining, it only intensified the fears of remaining depositors that they could lose their money. Moreover, a bank run at one bank often triggered a chain reaction of runs on other banks. In the late nineteenth and early twentieth century, bank runs were typically not the original cause of a recession—but they could make a recession much worse.

Deposit Insurance

To protect against bank runs, Congress has put two strategies into place: **deposit insurance** and the lender of last resort. Deposit insurance is an insurance system that makes sure depositors in a bank do not lose their money, even if the bank goes bankrupt. About 70 countries around the world, including all of the major economies, have deposit insurance programs. In the United States, the Federal Deposit Insurance Corporation (FDIC) is responsible for deposit insurance. Banks pay an insurance premium to the FDIC. The insurance premium is based on the bank’s level of deposits, and then adjusted according to the riskiness of a bank’s financial situation. In 2009, for example, a fairly safe bank with a high net worth might have paid 10–20 cents in insurance premiums for every $100 in bank deposits, while a risky bank with very low net worth might have paid 50–60 cents for every $100 in bank deposits.

Bank examiners from the FDIC evaluate the banks' balance sheets, looking at the asset and liability values to determine the risk level. The FDIC provides deposit insurance for about 4,914 banks (as of the third quarter of 2021). Even if a bank fails, the government guarantees that depositors will receive up to $250,000 of their money in each account, which is enough for almost all individuals, although not sufficient for many businesses. Since the United States enacted deposit insurance in the 1930s, no one has lost any of their insured deposits. Bank runs no longer happen at insured banks.

Lender of Last Resort

The problem with bank runs is not that insolvent banks will fail; they are, after all, bankrupt and need to be shut down. The problem is that bank runs can cause solvent banks to fail and spread to the rest of the financial system. To prevent this, the Fed stands ready to lend to banks and other financial institutions when they cannot obtain funds from anywhere else. This is known as the **lender of last resort** role. For banks, the central bank acting as a lender of last resort helps to reinforce the effect of deposit insurance and to reassure bank customers that they will not lose their money.

The lender of last resort task can arise in other financial crises, as well. During the 1987 stock market crash panic, when U.S. stock values fell by 25% in a single day, the Federal Reserve made a number of short-term emergency loans so that the financial system could keep functioning. During the 2008-2009 recession, we can interpret the Fed's “quantitative easing” policies (discussed below) as a willingness to make short-term credit available as needed in a time when the banking and financial system was under stress.

28.3 How a Central Bank Executes Monetary Policy

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Explain the reason for open market operations
- Evaluate reserve requirements and discount rates
- Interpret and show bank activity through balance sheets

The Federal Reserve's most important function is to conduct the nation’s monetary policy. Article I, Section 8 of the U.S. Constitution gives Congress the power “to coin money” and “to regulate the value thereof.” As part of

the 1913 legislation that created the Federal Reserve, Congress delegated these powers to the Fed. Monetary policy involves managing interest rates and credit conditions, which influences the level of economic activity, as we describe in more detail below.

A central bank has three traditional tools to implement monetary policy in the economy:

- Open market operations
- Changing reserve requirements
- Changing the discount rate

In discussing how these three tools work, it is useful to think of the central bank as a "bank for banks"—that is, each private-sector bank has its own account at the central bank. We will discuss each of these monetary policy tools in the sections below.

Open Market Operations

Since the early 1920s, the most common monetary policy tool in the U.S. has been **open market operations**. These take place when the central bank sells or buys U.S. Treasury bonds in order to influence the quantity of bank reserves and the level of interest rates. The specific interest rate targeted in open market operations is the federal funds rate. The name is a bit of a misnomer since the federal funds rate is the interest rate that commercial banks charge making overnight loans to other banks. As such, it is a very short term interest rate, but one that reflects credit conditions in financial markets very well.

The **Federal Open Market Committee (FOMC)** makes the decisions regarding these open market operations. The FOMC comprises seven members of the Federal Reserve's Board of Governors. It also includes five voting members who the Board draws, on a rotating basis, from the regional Federal Reserve Banks. The New York district president is a permanent FOMC voting member and the Board fills other four spots on a rotating, annual basis, from the other 11 districts. The FOMC typically meets every six weeks, but it can meet more frequently if necessary. The FOMC tries to act by consensus; however, the Federal Reserve's chairman has traditionally played a very powerful role in defining and shaping that consensus. For the Federal Reserve, and for most central banks, open market operations have, over the last few decades, been the most commonly used tool of monetary policy.

LINK IT UP

Visit this website (http://openstax.org/l/monetarypolicy) for the Federal Reserve to learn more about current monetary policy.

To understand how open market operations affect the money supply, consider the balance sheet of Happy Bank, displayed in Figure 28.5. Figure 28.5 (a) shows that Happy Bank starts with $460 million in assets, divided among reserves, bonds and loans, and $400 million in liabilities in the form of deposits, with a net worth of $60 million. When the central bank purchases $20 million in bonds from Happy Bank, the bond holdings of Happy Bank fall by $20 million and the bank's reserves rise by $20 million, as Figure 28.5 (b) shows. However, Happy Bank only wants to hold $40 million in reserves (the quantity of reserves with which it started in Figure 28.5) (a), so the bank decides to loan out the extra $20 million in reserves and its loans rise by $20 million, as Figure 28.5(c) shows. The central bank's open market operation causes Happy Bank to make loans instead of holding its assets in the form of government bonds, which expands the money supply. As the new loans are deposited in banks throughout the economy, these banks will, in turn, loan out some of the deposits they receive, triggering the money multiplier that we discussed in Money and Banking.

Assets		Liabilities + Net Worth	
Reserves	40	Deposits	400
Bonds	120		
Loans	300	Net Worth	60

(a) The original balance sheet

Assets		Liabilities + Net Worth	
Reserves	40 + 20 = 60	Deposits	400
Bonds	120 – 20 = 100		
Loans	300	Net Worth	60

(b) The central bank buys bonds

Assets		Liabilities + Net Worth	
Reserves	60 – 20 = 40	Deposits	400
Bonds	100		
Loans	300 + 20 = 320	Net Worth	60

(c) The bank makes additional loans

FIGURE 28.5

Where did the Federal Reserve get the $20 million that it used to purchase the bonds? A central bank has the power to create money. In practical terms, the Federal Reserve would write a check to Happy Bank, so that Happy Bank can have that money credited to its bank account at the Federal Reserve. In truth, the Federal Reserve created the money to purchase the bonds out of thin air—or with a few clicks on some computer keys.

Open market operations can also reduce the quantity of money and loans in an economy. Figure 28.6 (a) shows the balance sheet of Happy Bank before the central bank sells bonds in the open market. When Happy Bank purchases $30 million in bonds, Happy Bank sends $30 million of its reserves to the central bank, but now holds an additional $30 million in bonds, as Figure 28.6 (b) shows. However, Happy Bank wants to hold $40 million in reserves, as in Figure 28.6 (a), so it will adjust down the quantity of its loans by $30 million, to bring its reserves back to the desired level, as Figure 28.6 (c) shows. In practical terms, a bank can easily reduce its quantity of loans. At any given time, a bank is receiving payments on loans that it made previously and also making new loans. If the bank just slows down or briefly halts making new loans, and instead adds those funds to its reserves, then its overall quantity of loans will decrease. A decrease in the quantity of loans also means fewer deposits in other banks, and other banks reducing their lending as well, as the money multiplier that we discussed in Money and Banking takes effect. What about all those bonds? How do they affect the money supply? Read the following Clear It Up feature for the answer.

Assets		Liabilities + Net Worth	
Reserves	40	Deposits	400
Bonds	120		
Loans	300	Net Worth	60

(a) The original balance sheet

Assets		Liabilities + Net Worth	
Reserves	40 - 30 = 10	Deposits	400
Bonds	120 + 30 = 150		
Loans	300	Net Worth	60

(b) The central bank sells bonds to the bank

Assets		Liabilities + Net Worth	
Reserves	10 + 30 = 40	Deposits	400
Bonds	150		
Loans	300 – 30 = 270	Net Worth	60

(c) The bank makes fewer loans

FIGURE 28.6

CLEAR IT UP

Does selling or buying bonds increase the money supply?

Is it a sale of bonds by the central bank which increases bank reserves and lowers interest rates or is it a purchase of bonds by the central bank? The easy way to keep track of this is to treat the central bank as being *outside* the banking system. When a central bank buys bonds, money is flowing from the central bank to individual banks in the economy, increasing the money supply in circulation. When a central bank sells bonds, then money from individual banks in the economy is flowing into the central bank—reducing the quantity of money in the economy.

The Federal Reserve was founded in the aftermath of the 1907 Financial Panic when many banks failed as a result of bank runs. As mentioned earlier, since banks make profits by lending out their deposits, no bank, even those that are not bankrupt, can withstand a bank run. As a result of the Panic, the Federal Reserve was founded to be the "lender of last resort." In the event of a bank run, sound banks, (banks that were not bankrupt) could borrow as much cash as they needed from the Fed's discount "window" to quell the bank run. We call the interest rate banks pay for such loans the **discount rate**. (They are so named because the bank makes loans against its outstanding loans "at a discount" of their face value.) Once depositors became convinced that the bank would be able to honor their withdrawals, they no longer had a reason to make a run on the bank. In short, the Federal Reserve was originally intended to provide credit passively, but in the years since its founding, the Fed has taken on a more active role with monetary policy.

The second traditional method for conducting monetary policy is to raise or lower the discount rate. If the central bank raises the discount rate, then commercial banks will reduce their borrowing of reserves from the Fed, and instead call in loans to replace those reserves. Since fewer loans are available, the money supply falls and market interest rates rise. If the central bank lowers the discount rate it charges to banks, the process works in reverse.

In recent decades, the Federal Reserve has made relatively few discount loans. Before a bank borrows from the Federal Reserve to fill out its required reserves, the bank is expected to first borrow from other available sources, like other banks. This is encouraged by the Fed charging a higher discount rate than the federal funds rate. Given that most banks borrow little at the discount rate, changing the discount rate up or down has little

impact on their behavior. More importantly, the Fed has found from experience that open market operations are a more precise and powerful means of executing any desired monetary policy.

Changing Reserve Requirements

A potential third method of conducting monetary policy is for the central bank to raise or lower the **reserve requirement**, which, as we noted earlier, is the percentage of each bank's deposits that it is legally required to hold either as cash in their vault or on deposit with the central bank. If banks are required to hold a greater amount in reserves, they have less money available to lend out. If banks are allowed to hold a smaller amount in reserves, they will have a greater amount of money available to lend out.

Until very recently, the Federal Reserve required banks to hold reserves equal to 0% of the first $14.5 million in deposits, then to hold reserves equal to 3% of the deposits up to $103.6 million, and 10% of any amount above $103.6 million. The Fed makes small changes in the reserve requirements almost every year. For example, the $103.6 million dividing line is sometimes bumped up or down by a few million dollars. Today, these rates are no longer in effect; as of March 2020 (when the pandemic-induced recession hit), the 10% and 3% requirements were reduced to 0%, effectively eliminating the reserve requirement for all depository institutions.

The Fed rarely uses large changes in reserve requirements to execute monetary policy; the pandemic was an exception for obvious reasons. Also, a sudden demand that all banks increase their reserves would be extremely disruptive and difficult for them to comply. While loosening requirements too much might create a danger of banks' inability to meet withdrawal demands, the benefits of reducing the reserve requirements in March 2020 exceeded the risks.

Changing the Discount Rate

In the Federal Reserve Act, the phrase "...to afford means of rediscounting commercial paper" is contained in its long title. This was the main tool for monetary policy when the Fed was initially created. Today, the Federal Reserve has even more tools at its disposal, including quantitative easing, overnight repurchase agreements, and interest on excess reserves. This illustrates how monetary policy has evolved and how it continues to do so.

LINK IT UP

While these topics are beyond the scope of an introductory textbook, if you're interested in learning more about the Federal Reserve's newest policy tools, visit the Federal Reserve Bank of New York's page on large-scale asset purchases and the Federal Reserve Bank of St. Louis' FRED Blog post on fixing the textbook lag to learn more.

28.4 Monetary Policy and Economic Outcomes

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Contrast expansionary monetary policy and contractionary monetary policy
- Explain how monetary policy impacts interest rates and aggregate demand
- Evaluate Federal Reserve decisions over the last forty years
- Explain the significance of quantitative easing (QE)

A monetary policy that lowers interest rates and stimulates borrowing is an **expansionary monetary policy** or **loose monetary policy**. Conversely, a monetary policy that raises interest rates and reduces borrowing in the economy is a **contractionary monetary policy** or **tight monetary policy**. This module will discuss how expansionary and contractionary monetary policies affect interest rates and aggregate demand, and how such policies will affect macroeconomic goals like unemployment and inflation. We will conclude with a look at the

Fed's monetary policy practice in recent decades.

The Effect of Monetary Policy on Interest Rates

Consider the market for loanable bank funds in Figure 28.7. The original equilibrium (E_0) occurs at an 8% interest rate and a quantity of funds loaned and borrowed of $10 billion. An expansionary monetary policy will shift the supply of loanable funds to the right from the original supply curve (S_0) to S_1, leading to an equilibrium (E_1) with a lower 6% interest rate and a quantity $14 billion in loaned funds. Conversely, a contractionary monetary policy will shift the supply of loanable funds to the left from the original supply curve (S_0) to S_2, leading to an equilibrium (E_2) with a higher 10% interest rate and a quantity of $8 billion in loaned funds.

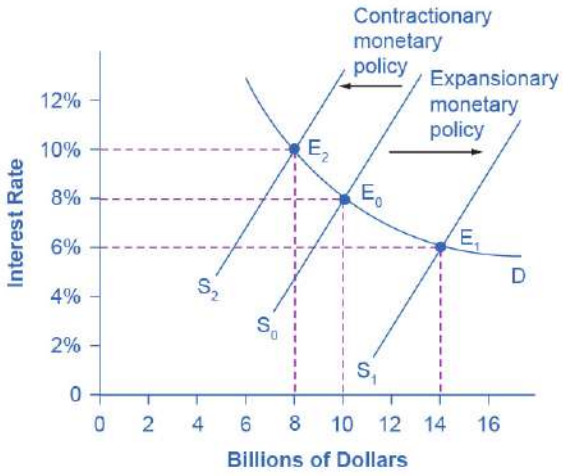

FIGURE 28.7 Monetary Policy and Interest Rates The original equilibrium occurs at E_0. An expansionary monetary policy will shift the supply of loanable funds to the right from the original supply curve (S_0) to the new supply curve (S_1) and to a new equilibrium of E_1, reducing the interest rate from 8% to 6%. A contractionary monetary policy will shift the supply of loanable funds to the left from the original supply curve (S_0) to the new supply (S_2), and raise the interest rate from 8% to 10%.

How does a central bank "raise" interest rates? When describing the central bank's monetary policy actions, it is common to hear that the central bank "raised interest rates" or "lowered interest rates." We need to be clear about this: more precisely, through open market operations the central bank changes bank reserves in a way which affects the supply curve of loanable funds. As a result, Figure 28.7 shows that interest rates change. If they do not meet the Fed's target, the Fed can supply more or less reserves until interest rates do.

Recall that the specific interest rate the Fed targets is the **federal funds rate**. The Federal Reserve has, since 1995, established its target federal funds rate in advance of any open market operations.

Of course, financial markets display a wide range of interest rates, representing borrowers with different risk premiums and loans that they must repay over different periods of time. In general, when the federal funds rate drops substantially, other interest rates drop, too, and when the federal funds rate rises, other interest rates rise. However, a fall or rise of one percentage point in the federal funds rate—which remember is for borrowing overnight—will typically have an effect of less than one percentage point on a 30-year loan to purchase a house or a three-year loan to purchase a car. Monetary policy can push the entire spectrum of interest rates higher or lower, but the forces of supply and demand in those specific markets for lending and borrowing set the specific interest rates.

The Effect of Monetary Policy on Aggregate Demand

Monetary policy affects interest rates and the available quantity of loanable funds, which in turn affects several components of aggregate demand. Tight or contractionary monetary policy that leads to higher interest rates

and a reduced quantity of loanable funds will reduce two components of aggregate demand. Business investment will decline because it is less attractive for firms to borrow money, and even firms that have money will notice that, with higher interest rates, it is relatively more attractive to put those funds in a financial investment than to make an investment in physical capital. In addition, higher interest rates will discourage consumer borrowing for big-ticket items like houses and cars. Conversely, loose or expansionary monetary policy that leads to lower interest rates and a higher quantity of loanable funds will tend to increase business investment and consumer borrowing for big-ticket items.

If the economy is suffering a recession and high unemployment, with output below potential GDP, expansionary monetary policy can help the economy return to potential GDP. Figure 28.8 (a) illustrates this situation. This example uses a short-run upward-sloping Keynesian aggregate supply curve (SRAS). The original equilibrium during a recession of E_0 occurs at an output level of 600. An expansionary monetary policy will reduce interest rates and stimulate investment and consumption spending, causing the original aggregate demand curve (AD_0) to shift right to AD_1, so that the new equilibrium (E_1) occurs at the potential GDP level of 700.

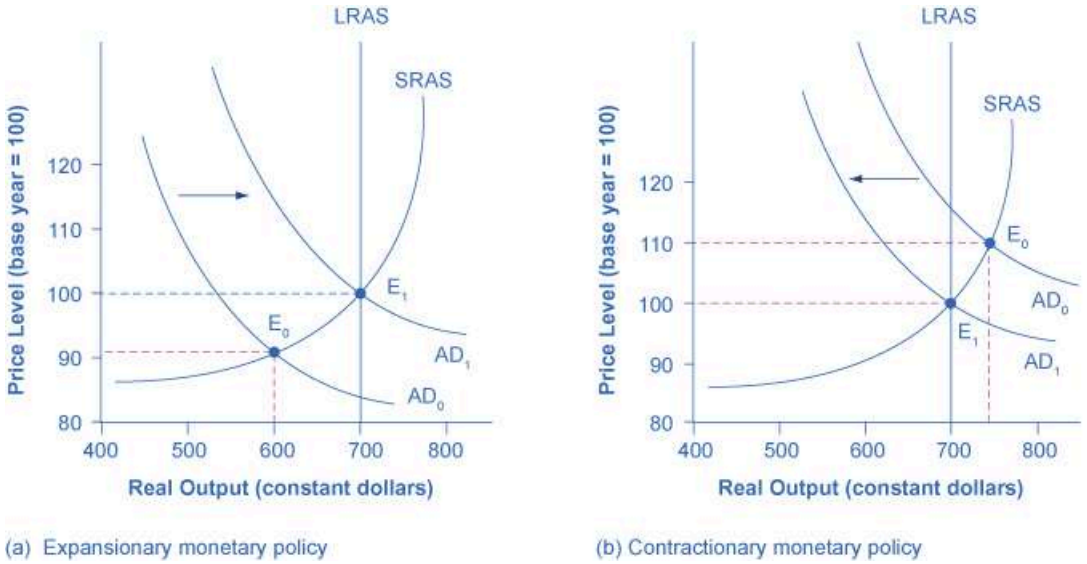

FIGURE 28.8 Expansionary or Contractionary Monetary Policy (a) The economy is originally in a recession with the equilibrium output and price shown at E_0. Expansionary monetary policy will reduce interest rates and shift aggregate demand to the right from AD_0 to AD_1, leading to the new equilibrium (E_1) at the potential GDP level of output with a relatively small rise in the price level. (b) The economy is originally producing above the potential GDP level of output at the equilibrium E_0 and is experiencing pressures for an inflationary rise in the price level. Contractionary monetary policy will shift aggregate demand to the left from AD_0 to AD_1, thus leading to a new equilibrium (E_1) at the potential GDP level of output.

Conversely, if an economy is producing at a quantity of output above its potential GDP, a contractionary monetary policy can reduce the inflationary pressures for a rising price level. In Figure 28.8 (b), the original equilibrium (E_0) occurs at an output of 750, which is above potential GDP. A contractionary monetary policy will raise interest rates, discourage borrowing for investment and consumption spending, and cause the original demand curve (AD_0) to shift left to AD_1, so that the new equilibrium (E_1) occurs at the potential GDP level of 700.

These examples suggest that monetary policy should be **countercyclical**; that is, it should act to counterbalance the business cycles of economic downturns and upswings. The Fed should loosen monetary policy when a recession has caused unemployment to increase and tighten it when inflation threatens. Of course, countercyclical policy does pose a danger of overreaction. If loose monetary policy seeking to end a recession goes too far, it may push aggregate demand so far to the right that it triggers inflation. If tight

monetary policy seeking to reduce inflation goes too far, it may push aggregate demand so far to the left that a recession begins. Figure 28.9 (a) summarizes the chain of effects that connect loose and tight monetary policy to changes in output and the price level.

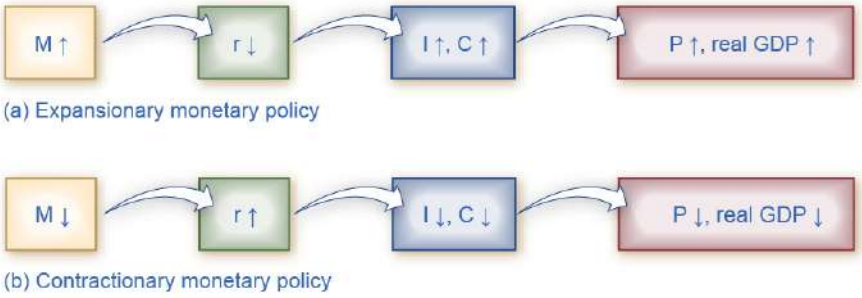

FIGURE 28.9 The Pathways of Monetary Policy (a) In expansionary monetary policy the central bank causes the supply of money and loanable funds to increase, which lowers the interest rate, stimulating additional borrowing for investment and consumption, and shifting aggregate demand right. The result is a higher price level and, at least in the short run, higher real GDP. (b) In contractionary monetary policy, the central bank causes the supply of money and credit in the economy to decrease, which raises the interest rate, discouraging borrowing for investment and consumption, and shifting aggregate demand left. The result is a lower price level and, at least in the short run, lower real GDP.

Federal Reserve Actions Over Last Four Decades

For the period from 1970 through 2020, we can summarize Federal Reserve monetary policy by looking at how it targeted the federal funds interest rate using open market operations.

Of course, telling the story of the U.S. economy since 1970 in terms of Federal Reserve actions leaves out many other macroeconomic factors that were influencing unemployment, recession, economic growth, and inflation over this time. The ten episodes of Federal Reserve action outlined in the sections below also demonstrate that we should consider the central bank as one of the leading actors influencing the macro economy. As we noted earlier, the single person with the greatest power to influence the U.S. economy is probably the Federal Reserve chairperson.

Figure 28.10 shows how the Federal Reserve has carried out monetary policy by targeting the federal funds interest rate in the last few decades. The graph shows the federal funds interest rate (remember, this interest rate is set through open market operations), the unemployment rate, and the inflation rate since 1970. Different episodes of monetary policy during this period are indicated in the figure.

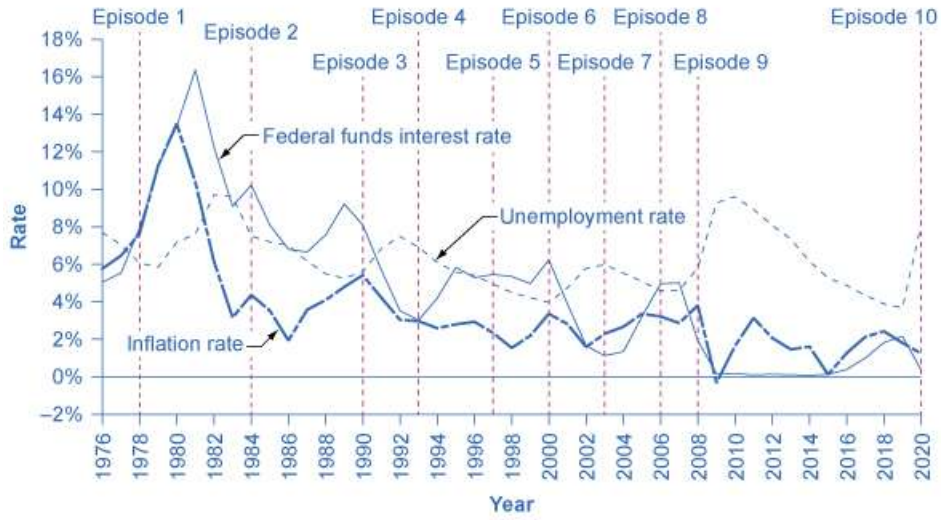

FIGURE 28.10 Monetary Policy, Unemployment, and Inflation Through the episodes here, the Federal Reserve typically reacted to higher inflation with a contractionary monetary policy and a higher interest rate, and reacted to higher unemployment with an expansionary monetary policy and a lower interest rate.

Episode 1

Consider Episode 1 in the late 1970s. The rate of inflation was very high, exceeding 10% in 1979 and 1980, so the Federal Reserve used tight monetary policy to raise interest rates, with the federal funds rate rising from 5.5% in 1977 to 16.4% in 1981. By 1983, inflation was down to 3.2%, but aggregate demand contracted sharply enough that back-to-back recessions occurred in 1980 and in 1981–1982, and the unemployment rate rose from 5.8% in 1979 to 9.7% in 1982.

Episode 2

In Episode 2, when economists persuaded the Federal Reserve in the early 1980s that inflation was declining, the Fed began slashing interest rates to reduce unemployment. The federal funds interest rate fell from 16.4% in 1981 to 6.8% in 1986. By 1986 or so, inflation had fallen to about 2% and the unemployment rate had come down to 7%, and was still falling.

Episode 3

However, in Episode 3 in the late 1980s, inflation appeared to be creeping up again, rising from 2% in 1986 up toward 5% by 1989. In response, the Federal Reserve used contractionary monetary policy to raise the federal funds rates from 6.6% in 1987 to 9.2% in 1989. The tighter monetary policy stopped inflation, which fell from above 5% in 1990 to under 3% in 1992, but it also helped to cause the 1990-1991 recession, and the unemployment rate rose from 5.3% in 1989 to 7.5% by 1992.

Episode 4

In Episode 4, in the early 1990s, when the Federal Reserve was confident that inflation was back under control, it reduced interest rates, with the federal funds interest rate falling from 8.1% in 1990 to 3.5% in 1992. As the economy expanded, the unemployment rate declined from 7.5% in 1992 to less than 5% by 1997.

Episodes 5 and 6

In Episodes 5 and 6, the Federal Reserve perceived a risk of inflation and raised the federal funds rate from 3% to 5.8% from 1993 to 1995. Inflation did not rise, and the period of economic growth during the 1990s continued. Then in 1999 and 2000, the Fed was concerned that inflation seemed to be creeping up so it raised the federal funds interest rate from 4.6% in December 1998 to 6.5% in June 2000. By early 2001, inflation was declining again, but a recession occurred in 2001. Between 2000 and 2002, the unemployment rate rose from

4.0% to 5.8%.

Episodes 7 and 8

In Episodes 7 and 8, the Federal Reserve conducted a loose monetary policy and slashed the federal funds rate from 6.2% in 2000 to just 1.7% in 2002, and then again to 1% in 2003. They actually did this because of fear of Japan-style deflation. This persuaded them to lower the Fed funds further than they otherwise would have. The recession ended, but, unemployment rates were slow to decline in the early 2000s. Finally, in 2004, the unemployment rate declined and the Federal Reserve began to raise the federal funds rate until it reached 5% by 2007.

Episode 9

In Episode 9, as the Great Recession took hold in 2008, the Federal Reserve was quick to slash interest rates, taking them down to 2% in 2008 and to nearly 0% in 2009. When the Fed had taken interest rates down to near-zero, the economy was still deep in recession. Open market operations could not make the interest rate turn negative. The Federal Reserve had to think "outside the box."

Episode 10

In Episode 10, which started in March 2020, the Fed cut interest rates again, reducing the target federal funds rate from 2% to between 0–1/4% in a matter of weeks. Limited by the zero lower bound, the Fed once again had to think "outside the box" in order to further support the financial system.

Quantitative Easing

The most powerful and commonly used of the three traditional tools of monetary policy—open market operations—works by expanding or contracting the money supply in a way that influences the interest rate. In late 2008, as the U.S. economy struggled with recession, the Federal Reserve had already reduced the interest rate to near-zero. With the recession still ongoing, the Fed decided to adopt an innovative and nontraditional policy known as **quantitative easing (QE)**. This is the purchase of long-term government and private mortgage-backed securities by central banks to make credit available so as to stimulate aggregate demand.

Quantitative easing differed from traditional monetary policy in several key ways. First, it involved the Fed purchasing long term Treasury bonds, rather than short term Treasury bills. In 2008, however, it was impossible to stimulate the economy any further by lowering short term rates because they were already as low as they could get. (Read the closing Bring it Home feature for more on this.) Therefore, Chairman Bernanke sought to lower long-term rates utilizing quantitative easing.

This leads to a second way QE is different from traditional monetary policy. Instead of purchasing Treasury securities, the Fed also began purchasing private mortgage-backed securities, something it had never done before. During the financial crisis, which precipitated the recession, mortgage-backed securities were termed "toxic assets," because when the housing market collapsed, no one knew what these securities were worth, which put the financial institutions which were holding those securities on very shaky ground. By offering to purchase mortgage-backed securities, the Fed was both pushing long term interest rates down and also removing possibly "toxic assets" from the balance sheets of private financial firms, which would strengthen the financial system.

Quantitative easing (QE) occurred in three episodes:

1. During QE_1, which began in November 2008, the Fed purchased $600 billion in mortgage-backed securities from government enterprises Fannie Mae and Freddie Mac.
2. In November 2010, the Fed began QE_2, in which it purchased $600 billion in U.S. Treasury bonds.
3. QE_3, began in September 2012 when the Fed commenced purchasing $40 billion of additional mortgage-backed securities per month. This amount was increased in December 2012 to $85 billion per month. The Fed stated that, when economic conditions permit, it will begin tapering (or reducing the monthly

purchases). By October 2014, the Fed had announced the final $15 billion bond purchase, ending Quantitative Easing.

We usually think of the quantitative easing policies that the Federal Reserve adopted (as did other central banks around the world) as temporary emergency measures. If these steps are to be temporary, then the Federal Reserve will need to stop making these additional loans and sell off the financial securities it has accumulated. The concern is that the process of quantitative easing may prove more difficult to reverse than it was to enact. The evidence suggests that QE_1 was somewhat successful, but that QE_2 and QE_3 have been less so.

Fast forward to March 2020, when the Fed under the leadership of Jerome Powell promised another round of asset purchases which was dubbed by some as "QE4," intended once again to provide liquidity to a distressed financial system in the wake of the pandemic. This round was much faster, increasing Fed assets by $2 trillion in just a few months. Recently, the Fed has begun to slow down the purchase of these assets once again through a taper, and the pace of the tapering is expected to increase through 2022. But as of the end of 2021, total Fed assets exceed $8 trillion, compared to $4 trillion in February 2020.

28.5 Pitfalls for Monetary Policy

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Analyze whether monetary policy decisions should be made more democratically
- Calculate the velocity of money
- Evaluate the central bank's influence on inflation, unemployment, asset bubbles, and leverage cycles
- Calculate the effects of monetary stimulus

In the real world, effective monetary policy faces a number of significant hurdles. Monetary policy affects the economy only after a time lag that is typically long and of variable length. Remember, monetary policy involves a chain of events: the central bank must perceive a situation in the economy, hold a meeting, and make a decision to react by tightening or loosening monetary policy. The change in monetary policy must percolate through the banking system, changing the quantity of loans and affecting interest rates. When interest rates change, businesses must change their investment levels and consumers must change their borrowing patterns when purchasing homes or cars. Then it takes time for these changes to filter through the rest of the economy.

As a result of this chain of events, monetary policy has little effect in the immediate future. Instead, its primary effects are felt perhaps one to three years in the future. The reality of long and variable time lags does not mean that a central bank should refuse to make decisions. It does mean that central banks should be humble about taking action, because of the risk that their actions can create as much or more economic instability as they resolve.

Excess Reserves

Banks are legally required to hold a minimum level of reserves, but no rule prohibits them from holding additional **excess reserves** above the legally mandated limit. For example, during a recession banks may be hesitant to lend, because they fear that when the economy is contracting, a high proportion of loan applicants become less likely to repay their loans.

When many banks are choosing to hold excess reserves, expansionary monetary policy may not work well. This may occur because the banks are concerned about a deteriorating economy, while the central bank is trying to expand the money supply. If the banks prefer to hold excess reserves above the legally required level, the central bank cannot force individual banks to make loans. Similarly, sensible businesses and consumers may be reluctant to borrow substantial amounts of money in a recession, because they recognize that firms' sales and employees' jobs are more insecure in a recession, and they do not want to face the need to make interest payments. The result is that during an especially deep recession, an expansionary monetary policy

may have little effect on either the price level or the real GDP.

Japan experienced this situation in the 1990s and early 2000s. Japan's economy entered a period of very slow growth, dipping in and out of recession, in the early 1990s. By February 1999, the Bank of Japan had lowered the equivalent of its federal funds rate to 0%. It kept it there most of the time through 2003. Moreover, in the two years from March 2001 to March 2003, the Bank of Japan also expanded the country's money supply by about 50%—an enormous increase. Even this highly expansionary monetary policy, however, had no substantial effect on stimulating aggregate demand. Japan's economy continued to experience extremely slow growth into the mid-2000s.

CLEAR IT UP

Should monetary policy decisions be made more democratically?

Should a nation's Congress or legislature comprised of elected representatives conduct monetary policy or should a politically appointed central bank that is more independent of voters take charge? Here are some of the arguments.

The Case for Greater Democratic Control of Monetary Policy

Elected representatives pass taxes and spending bills to conduct fiscal policy by passing tax and spending bills. They could handle monetary policy in the same way. They will sometimes make mistakes, but in a democracy, it is better to have elected officials who are accountable to voters make mistakes instead of political appointees. After all, the people appointed to the top governing positions at the Federal Reserve—and to most central banks around the world—are typically bankers and economists. They are not representatives of borrowers like small businesses or farmers nor are they representatives of labor unions. Central banks might not be so quick to raise interest rates if they had to pay more attention to firms and people in the real economy.

The Case for an Independent Central Bank

Because the central bank has some insulation from day-to-day politics, its members can take a nonpartisan look at specific economic situations and make tough, immediate decisions when necessary. The idea of giving a legislature the ability to create money and hand out loans is likely to end up badly, sooner or later. It is simply too tempting for lawmakers to expand the money supply to fund their projects. The long term result will be rampant inflation. Also, a central bank, acting according to the laws passed by elected officials, can respond far more quickly than a legislature. For example, the U.S. budget takes months to debate, pass, and sign into law, but monetary policy decisions happen much more rapidly. Day-to-day democratic control of monetary policy is impractical and seems likely to lead to an overly expansionary monetary policy and higher inflation.

The problem of excess reserves does not affect contractionary policy. Central bankers have an old saying that monetary policy can be like pulling and pushing on a string: when the central bank pulls on the string and uses contractionary monetary policy, it can definitely raise interest rates and reduce aggregate demand. However, when the central bank tries to push on the string of expansionary monetary policy, the string may sometimes just fold up limp and have little effect, because banks decide not to loan out their excess reserves. Do not take this analogy too literally—expansionary monetary policy usually does have real effects, after that inconveniently long and variable lag. There are also times, like Japan's economy in the late 1990s and early 2000s, when expansionary monetary policy has been insufficient to lift a recession-prone economy.

Unpredictable Movements of Velocity

Velocity is a term that economists use to describe how quickly money circulates through the economy. We define the **velocity** of money in a year as:

$$\text{Velocity} = \frac{\text{nominal GDP}}{\text{money supply}}$$

Specific measurements of velocity depend on the definition of the money supply used. Consider the velocity of

M1, the total amount of currency in circulation and checking account balances. In 2009, for example, M1 was $1.7 trillion and nominal GDP was $14.3 trillion, so the velocity of M1 was 8.4 (which is $14.3 trillion/$1.7 trillion). A higher velocity of money means that the average dollar circulates more times in a year. A lower velocity means that the average dollar circulates fewer times in a year.

See the following Clear It Up feature for a discussion of how deflation could affect monetary policy.

CLEAR IT UP

What happens during episodes of deflation?

Deflation occurs when the rate of inflation is negative; that is, instead of money having less purchasing power over time, as occurs with inflation, money is worth more. Deflation can make it very difficult for monetary policy to address a recession.

Remember that the real interest rate is the nominal interest rate minus the rate of inflation. If the nominal interest rate is 7% and the rate of inflation is 3%, then the borrower is effectively paying a 4% real interest rate. If the nominal interest rate is 7% and there is *deflation* of 2%, then the real interest rate is actually 9%. In this way, an unexpected deflation raises the real interest payments for borrowers. It can lead to a situation where borrowers do not repay an unexpectedly high number of loans, and banks find that their net worth is decreasing or negative. When banks are suffering losses, they become less able and eager to make new loans. Aggregate demand declines, which can lead to recession.

Then the double-whammy: After causing a recession, deflation can make it difficult for monetary policy to work. Say that the central bank uses expansionary monetary policy to reduce the nominal interest rate all the way to zero—but the economy has 5% deflation. As a result, the real interest rate is 5%, and because a central bank cannot make the nominal interest rate negative, expansionary policy cannot reduce the real interest rate further.

In the U.S. economy during the early 1930s, deflation was 6.7% per year from 1930–1933, which caused many borrowers to default on their loans and many banks to end up bankrupt, which in turn contributed substantially to the Great Depression. Not all episodes of deflation, however, end in economic depression. Japan, for example, experienced deflation of slightly less than 1% per year from 1999–2002, which hurt the Japanese economy, but it still grew by about 0.9% per year over this period. There is at least one historical example of deflation coexisting with rapid growth. The U.S. economy experienced deflation of about 1.1% per year over the quarter-century from 1876–1900, but real GDP also expanded at a rapid clip of 4% per year over this time, despite some occasional severe recessions.

The central bank should be on guard against deflation and, if necessary, use expansionary monetary policy to prevent any long-lasting or extreme deflation from occurring. Except in severe cases like the Great Depression, deflation does not guarantee economic disaster.

Changes in velocity can cause problems for monetary policy. To understand why, rewrite the definition of velocity so that the money supply is on the left-hand side of the equation. That is:

$$\text{Money supply} \times \text{velocity} = \text{Nominal GDP}$$

Recall from The Macroeconomic Perspective that

$$\text{Nominal GDP} = \text{Price Level (or GDP Deflator)} \times \text{Real GDP}.$$

Therefore,

$$\text{Money Supply} \times \text{velocity} = \text{Nominal GDP} = \text{Price Level} \times \text{Real GDP}.$$

We sometimes call this equation the **basic quantity equation of money** but, as you can see, it is just the definition of velocity written in a different form. This equation must hold true, by definition.

If velocity is constant over time, then a certain percentage rise in the money supply on the left-hand side of the basic quantity equation of money will inevitably lead to the same percentage rise in nominal GDP—although this change could happen through an increase in inflation, or an increase in real GDP, or some combination of the two. If velocity is changing over time but in a constant and predictable way, then changes in the money supply will continue to have a predictable effect on nominal GDP. If velocity changes unpredictably over time, however, then the effect of changes in the money supply on nominal GDP becomes unpredictable.

Figure 28.11 illustrates the actual velocity of money in the U.S. economy as measured by using M1, the most common definition of the money supply. From 1960 up to about 1980, velocity appears fairly predictable; that is, it is increasing at a fairly constant rate. In the early 1980s, however, velocity as calculated with M1 becomes more variable. The reasons for these sharp changes in velocity remain a puzzle. Economists suspect that the changes in velocity are related to innovations in banking and finance which have changed how we are using money in making economic transactions: for example, the growth of electronic payments; a rise in personal borrowing and credit card usage; and accounts that make it easier for people to hold money in savings accounts, where it is counted as M2, right up to the moment that they want to write a check on the money and transfer it to M1. So far at least, it has proven difficult to draw clear links between these kinds of factors and the specific up-and-down fluctuations in M1. Given many changes in banking and the prevalence of electronic banking, economists now favor M2 as a measure of money rather than the narrower M1.

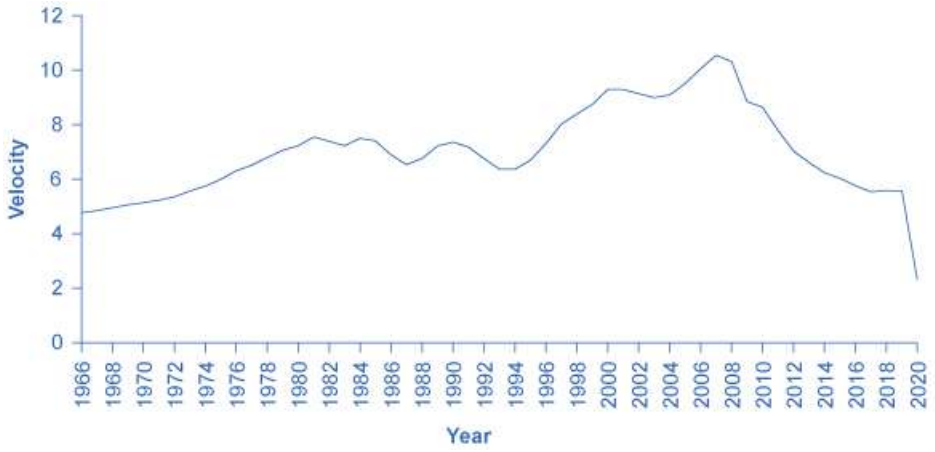

FIGURE 28.11 Velocity Calculated Using M1 Velocity is the nominal GDP divided by the money supply for a given year. We can calculate different measures of velocity by using different measures of the money supply. Velocity, as calculated by using M1, has lacked a steady trend since the 1980s, instead bouncing up and down. Note also that the redefinition of M1 to include savings deposits in 2020 (see Money and Banking) drastically increased M1 in 2020, causing velocity to plummet. (credit: Federal Reserve Bank of St. Louis)

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Velocity Calculated Using M1

In the 1970s, when velocity as measured by M1 seemed predictable, a number of economists, led by Nobel laureate Milton Friedman (1912–2006), argued that the best monetary policy was for the central bank to increase the money supply at a constant growth rate. These economists argued that with the long and variable lags of monetary policy, and the political pressures on central bankers, central bank monetary policies were as likely to have undesirable as to have desirable effects. Thus, these economists believed that the monetary policy should seek steady growth in the money supply of 3% per year. They argued that a steady monetary growth rate would be correct over longer time periods, since it would roughly match the growth of the real economy. In addition, they argued that giving the central bank less discretion to conduct monetary policy would prevent an overly activist central bank from becoming a source of economic instability and uncertainty. In this spirit, Friedman wrote in 1967: "The first and most important lesson that history teaches about what

monetary policy can do—and it is a lesson of the most profound importance—is that monetary policy can prevent money itself from being a major source of economic disturbance."

As the velocity of M1 began to fluctuate in the 1980s, having the money supply grow at a predetermined and unchanging rate seemed less desirable, because as the quantity theory of money shows, the combination of constant growth in the money supply and fluctuating velocity would cause nominal GDP to rise and fall in unpredictable ways. The jumpiness of velocity in the 1980s caused many central banks to focus less on the rate at which the quantity of money in the economy was increasing, and instead to set monetary policy by reacting to whether the economy was experiencing or in danger of higher inflation or unemployment.

Unemployment and Inflation

If you were to survey central bankers around the world and ask them what they believe should be the primary task of monetary policy, the most popular answer by far would be fighting inflation. Most central bankers believe that the neoclassical model of economics accurately represents the economy over the medium to long term. Remember that in the neoclassical model of the economy, we draw the aggregate supply curve as a vertical line at the level of potential GDP, as Figure 28.12 shows. In the neoclassical model, economists determine the level of potential GDP (and the natural rate of unemployment that exists when the economy is producing at potential GDP) by real economic factors. If the original level of aggregate demand is AD_0, then an expansionary monetary policy that shifts aggregate demand to AD_1 only creates an inflationary increase in the price level, but it does not alter GDP or unemployment. From this perspective, all that monetary policy can do is to lead to low inflation or high inflation—and low inflation provides a better climate for a healthy and growing economy. After all, low inflation means that businesses making investments can focus on real economic issues, not on figuring out ways to protect themselves from the costs and risks of inflation. In this way, a consistent pattern of low inflation can contribute to long-term growth.

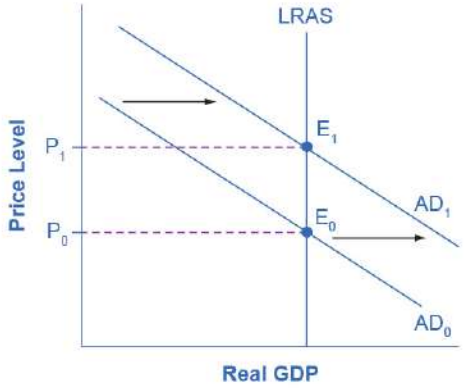


FIGURE 28.12 Monetary Policy in a Neoclassical Model In a neoclassical view, monetary policy affects only the price level, not the level of output in the economy. For example, an expansionary monetary policy causes aggregate demand to shift from the original AD_0 to AD_1. However, the adjustment of the economy from the original equilibrium (E_0) to the new equilibrium (E_1) represents an inflationary increase in the price level from P_0 to P_1, but has no effect in the long run on output or the unemployment rate. In fact, no shift in AD will affect the equilibrium quantity of output in this model.

This vision of focusing monetary policy on a low rate of inflation is so attractive that many countries have rewritten their central banking laws since in the 1990s to have their bank practice **inflation targeting**, which means that the central bank is legally required to focus primarily on keeping inflation low. By 2014, central banks in 28 countries, including Austria, Brazil, Canada, Israel, Korea, Mexico, New Zealand, Spain, Sweden, Thailand, and the United Kingdom faced a legal requirement to target the inflation rate. A notable exception is the Federal Reserve in the United States, which does not practice inflation-targeting. Instead, the law governing the Federal Reserve requires it to take both unemployment and inflation into account.

Economists have no final consensus on whether a central bank should be required to focus only on inflation or should have greater discretion. For those who subscribe to the inflation targeting philosophy, the fear is that politicians who are worried about slow economic growth and unemployment will constantly pressure the central bank to conduct a loose monetary policy—even if the economy is already producing at potential GDP. In some countries, the central bank may lack the political power to resist such pressures, with the result of higher inflation, but no long-term reduction in unemployment. The U.S. Federal Reserve has a tradition of independence, but central banks in other countries may be under greater political pressure. For all of these reasons—long and variable lags, excess reserves, unstable velocity, and controversy over economic goals—monetary policy in the real world is often difficult. The basic message remains, however, that central banks can affect aggregate demand through the conduct of monetary policy and in that way influence macroeconomic outcomes.

Asset Bubbles and Leverage Cycles

One long-standing concern about having the central bank focus on inflation and unemployment is that it may be overlooking certain other economic problems that are coming in the future. For example, from 1994 to 2000 during what was known as the "dot-com" boom, the U.S. stock market, which the Dow Jones Industrial Index measures (which includes 30 very large companies from across the U.S. economy), nearly tripled in value. The Nasdaq index, which includes many smaller technology companies, increased in value by a multiple of five from 1994 to 2000. These rates of increase were clearly not sustainable. Stock values as measured by the Dow Jones were almost 20% lower in 2009 than they had been in 2000. Stock values in the Nasdaq index were 50% lower in 2009 than they had been in 2000. The drop-off in stock market values contributed to the 2001 recession and the higher unemployment that followed.

We can tell a similar story about housing prices in the mid-2000s. During the 1970s, 1980s, and 1990s, housing prices increased at about 6% per year on average. During what came to be known as the "housing bubble" from 2003 to 2005, housing prices increased at almost double this annual rate. These rates of increase were clearly not sustainable. When housing prices fell in 2007 and 2008, many banks and households found that their assets were worth less than they expected, which contributed to the recession that started in 2007.

At a broader level, some economists worry about a leverage cycle, where "leverage" is a term financial economists use to mean "borrowing." When economic times are good, banks and the financial sector are eager to lend, and people and firms are eager to borrow. Remember that a money multiplier determines the amount of money and credit in an economy —a process of loans made, money deposited, and more loans made. In good economic times, this surge of lending exaggerates the episode of economic growth. It can even be part of what lead prices of certain assets—like stock prices or housing prices—to rise at unsustainably high annual rates. At some point, when economic times turn bad, banks and the financial sector become much less willing to lend, and credit becomes expensive or unavailable to many potential borrowers. The sharp reduction in credit, perhaps combined with the deflating prices of a dot-com stock price bubble or a housing bubble, makes the economic downturn worse than it would otherwise be.

Thus, some economists have suggested that the central bank should not just look at economic growth, inflation, and unemployment rates, but should also keep an eye on asset prices and leverage cycles. Such proposals are quite controversial. If a central bank had announced in 1997 that stock prices were rising "too fast" or in 2004 that housing prices were rising "too fast," and then taken action to hold down price increases, many people and their elected political representatives would have been outraged. Neither the Federal Reserve nor any other central banks want to take the responsibility of deciding when stock prices and housing prices are too high, too low, or just right. As further research explores how asset price bubbles and leverage cycles can affect an economy, central banks may need to think about whether they should conduct monetary policy in a way that would seek to moderate these effects.

Let's end this chapter with a Work it Out exercise in how the Fed—or any central bank—would stir up the economy by increasing the money supply.

WORK IT OUT

Calculating the Effects of Monetary Stimulus

Suppose that the central bank wants to stimulate the economy by increasing the money supply. The bankers estimate that the velocity of money is 3, and that the price level will increase from 100 to 110 due to the stimulus. Using the quantity equation of money, what will be the impact of an $800 billion dollar increase in the money supply on the quantity of goods and services in the economy given an initial money supply of $4 trillion?

Step 1. We begin by writing the quantity equation of money: MV = PQ. We know that initially V = 3, M = 4,000 (billion) and P = 100. Substituting these numbers in, we can solve for Q:

$$\begin{aligned} MV &= PQ \\ 4{,}000 \times 3 &= 100 \times Q \\ Q &= 120 \end{aligned}$$

Step 2. Now we want to find the effect of the addition $800 billion in the money supply, together with the increase in the price level. The new equation is:

$$\begin{aligned} MV &= PQ \\ 4{,}800 \times 3 &= 110 \times Q \\ Q &= 130.9 \end{aligned}$$

Step 3. If we take the difference between the two quantities, we find that the monetary stimulus increased the quantity of goods and services in the economy by 10.9 billion.

The discussion in this chapter has focused on domestic monetary policy; that is, the view of monetary policy within an economy. Exchange Rates and International Capital Flows explores the international dimension of monetary policy, and how monetary policy becomes involved with exchange rates and international flows of financial capital.

BRING IT HOME

The Problem of the Zero Percent Interest Rate Lower Bound

In 2008, the U.S. Federal Reserve found itself in a difficult position. The federal funds rate was on its way to near zero, which meant that traditional open market operations, by which the Fed purchases U.S. Treasury Bills to lower short term interest rates, was no longer viable. This so called "zero bound problem," prompted the Fed, under then Chair Ben Bernanke, to attempt some unconventional policies, collectively called quantitative easing. By early 2014, quantitative easing nearly quintupled the amount of bank reserves. This likely contributed to the U.S. economy's recovery, but the impact was muted, probably due to some of the hurdles mentioned in the last section of this module. The unprecedented increase in bank reserves also led to fears of inflation, which never bore out. Throughout the 2010s there have been no serious signs of inflation with core inflation around a stable 1.5–2%. As of early 2015, however, there have been no serious signs of a boom, with core inflation around a stable 1.7%.

The Zero Lower Bound was encountered again in 2020 due to the pandemic, when the target federal funds rate dropped by over two percentage points in a matter of weeks. The Fed further responded by increasing asset purchases by an even greater amount, and at a faster rate, than in 2009. When the U.S. started experiencing higher-than-average inflation in 2021, the Fed chair Jerome Powell responded to criticisms by saying that the Fed was poised to consider rate increases and start tapering the rate of asset purchases into 2022. It remains to be seen whether inflation can be tamed moving forward, or if more aggressive policy measures will be required.

Key Terms

bank run when depositors race to the bank to withdraw their deposits for fear that otherwise they would be lost

basic quantity equation of money money supply × velocity = nominal GDP

central bank institution which conducts a nation's monetary policy and regulates its banking system

contractionary monetary policy a monetary policy that reduces the supply of money and loans

countercyclical moving in the opposite direction of the business cycle of economic downturns and upswings

deposit insurance an insurance system that makes sure depositors in a bank do not lose their money, even if the bank goes bankrupt

discount rate the interest rate charged by the central bank on the loans that it gives to other commercial banks

excess reserves reserves banks hold that exceed the legally mandated limit

expansionary monetary policy a monetary policy that increases the supply of money and the quantity of loans

federal funds rate the interest rate at which one bank lends funds to another bank overnight

inflation targeting a rule that the central bank is required to focus only on keeping inflation low

lender of last resort an institution that provides short-term emergency loans in conditions of financial crisis

loose monetary policy see expansionary monetary policy

open market operations the central bank selling or buying Treasury bonds to influence the quantity of money and the level of interest rates

quantitative easing (QE) the purchase of long term government and private mortgage-backed securities by central banks to make credit available in hopes of stimulating aggregate demand

reserve requirement the percentage amount of its total deposits that a bank is legally obligated to either hold as cash in their vault or deposit with the central bank

tight monetary policy see contractionary monetary policy

velocity the speed with which money circulates through the economy; calculated as the nominal GDP divided by the money supply

Key Concepts and Summary

28.1 The Federal Reserve Banking System and Central Banks

The most prominent task of a central bank is to conduct monetary policy, which involves changes to interest rates and credit conditions, affecting the amount of borrowing and spending in an economy. Some prominent central banks around the world include the U.S. Federal Reserve, the European Central Bank, the Bank of Japan, and the Bank of England.

28.2 Bank Regulation

A bank run occurs when there are rumors (possibly true, possibly false) that a bank is at financial risk of having negative net worth. As a result, depositors rush to the bank to withdraw their money and put it someplace safer. Even false rumors, if they cause a bank run, can force a healthy bank to lose its deposits and be forced to close. Deposit insurance guarantees bank depositors that, even if the bank has negative net worth, their deposits will be protected. In the United States, the Federal Deposit Insurance Corporation (FDIC) collects deposit insurance premiums from banks and guarantees bank deposits up to $250,000. Bank supervision involves inspecting the balance sheets of banks to make sure that they have positive net worth and that their assets are not too risky. In the United States, the Office of the Comptroller of the Currency (OCC) is responsible for supervising banks and inspecting savings and loans and the National Credit Union Administration (NCUA) is responsible for inspecting credit unions. The FDIC and the Federal Reserve also play a role in bank supervision.

When a central bank acts as a lender of last resort, it makes short-term loans available in situations of severe

financial panic or stress. The failure of a single bank can be treated like any other business failure. Yet if many banks fail, it can reduce aggregate demand in a way that can bring on or deepen a recession. The combination of deposit insurance, bank supervision, and lender of last resort policies help to prevent weaknesses in the banking system from causing recessions.

28.3 How a Central Bank Executes Monetary Policy

A central bank has three traditional tools to conduct monetary policy: open market operations, which involves buying and selling government bonds with banks; reserve requirements, which determine what level of reserves a bank is legally required to hold; and discount rates, which is the interest rate charged by the central bank on the loans that it gives to other commercial banks. The most commonly used tool is open market operations.

28.4 Monetary Policy and Economic Outcomes

An expansionary (or loose) monetary policy raises the quantity of money and credit above what it otherwise would have been and reduces interest rates, boosting aggregate demand, and thus countering recession. A contractionary monetary policy, also called a tight monetary policy, reduces the quantity of money and credit below what it otherwise would have been and raises interest rates, seeking to hold down inflation. During the 2008–2009 recession, central banks around the world also used quantitative easing to expand the supply of credit.

28.5 Pitfalls for Monetary Policy

Monetary policy is inevitably imprecise, for a number of reasons: (a) the effects occur only after long and variable lags; (b) if banks decide to hold excess reserves, monetary policy cannot force them to lend; and (c) velocity may shift in unpredictable ways. The basic quantity equation of money is $MV = PQ$, where M is the money supply, V is the velocity of money, P is the price level, and Q is the real output of the economy. Some central banks, like the European Central Bank, practice inflation targeting, which means that the only goal of the central bank is to keep inflation within a low target range. Other central banks, such as the U.S. Federal Reserve, are free to focus on either reducing inflation or stimulating an economy that is in recession, whichever goal seems most important at the time.

Self-Check Questions

1. Why is it important for the members of the Board of Governors of the Federal Reserve to have longer terms in office than elected officials, like the President?
2. Given the danger of bank runs, why do banks not keep the majority of deposits on hand to meet the demands of depositors?
3. Bank runs are often described as “self-fulfilling prophecies.” Why is this phrase appropriate to bank runs?
4. If the central bank sells $500 in bonds to a bank that has issued $10,000 in loans and is exactly meeting the reserve requirement of 10%, what will happen to the amount of loans and to the money supply in general?
5. What would be the effect of increasing the banks' reserve requirements on the money supply?
6. Why does contractionary monetary policy cause interest rates to rise?
7. Why does expansionary monetary policy causes interest rates to drop?
8. Why might banks want to hold excess reserves in time of recession?
9. Why might the velocity of money change unexpectedly?

Review Questions

10. How is a central bank different from a typical commercial bank?

11. List the three traditional tools that a central bank has for controlling the money supply.

12. How is bank regulation linked to the conduct of monetary policy?

13. What is a bank run?

14. In a program of deposit insurance as it is operated in the United States, what is being insured and who pays the insurance premiums?

15. In government programs of bank supervision, what is being supervised?

16. What is the lender of last resort?

17. Name and briefly describe the responsibilities of each of the following agencies: FDIC, NCUA, and OCC.

18. Explain how to use an open market operation to expand the money supply.

19. Explain how to use the reserve requirement to expand the money supply.

20. Explain how to use the discount rate to expand the money supply.

21. How do the expansionary and contractionary monetary policy affect the quantity of money?

22. How do tight and loose monetary policy affect interest rates?

23. How do expansionary, tight, contractionary, and loose monetary policy affect aggregate demand?

24. Which kind of monetary policy would you expect in response to high inflation: expansionary or contractionary? Why?

25. Explain how to use quantitative easing to stimulate aggregate demand.

26. Which kind of monetary policy would you expect in response to recession: expansionary or contractionary? Why?

27. How might each of the following factors complicate the implementation of monetary policy: long and variable lags, excess reserves, and movements in velocity?

28. Define the velocity of the money supply.

29. What is the basic quantity equation of money?

30. How does a monetary policy of inflation target work?

Critical Thinking Questions

31. Why do presidents typically reappoint Chairs of the Federal Reserve Board even when they were originally appointed by a president of a different political party?

32. In what ways might monetary policy be superior to fiscal policy? In what ways might it be inferior?

33. The term “moral hazard” describes increases in risky behavior resulting from efforts to make that behavior safer. How does the concept of moral hazard apply to deposit insurance and other bank regulations?

34. Explain what would happen if banks were notified they had to increase their required reserves by one percentage point from, say, 9% to10% of deposits. What would their options be to come up with the cash?

35. A well-known economic model called the Phillips Curve (discussed in The Keynesian Perspective chapter) describes the short run tradeoff typically observed between inflation and unemployment. Based on the discussion of expansionary and contractionary monetary policy, explain why one of these variables usually falls when the other rises.

36. How does rule-based monetary policy differ from discretionary monetary policy (that is, monetary policy not based on a rule)? What are some of the arguments for each?

37. Is it preferable for central banks to primarily target inflation or unemployment? Why?

Problems

38. Suppose the Fed conducts an open market purchase by buying $10 million in Treasury bonds from Acme Bank. Sketch out the balance sheet changes that will occur as Acme converts the bond sale proceeds to new loans. The initial Acme bank balance sheet contains the following information: Assets – reserves 30, bonds 50, and loans 50; Liabilities – deposits 100 and equity 30.

39. Suppose the Fed conducts an open market sale by selling $10 million in Treasury bonds to Acme Bank. Sketch out the balance sheet changes that will occur as Acme restores its required reserves (10% of deposits) by reducing its loans. The initial balance sheet for Acme Bank contains the following information: Assets – reserves 30, bonds 50, and loans 250; Liabilities – deposits 300 and equity 30.

40. All other things being equal, by how much will nominal GDP expand if the central bank increases the money supply by $100 billion, and the velocity of money is 3? (Use this information as necessary to answer the following 4 questions.)

41. Suppose now that economists expect the velocity of money to increase by 50% as a result of the monetary stimulus. What will be the total increase in nominal GDP?

42. If GDP is 1,500 and the money supply is 400, what is velocity?

43. If GDP now rises to 1,600, but the money supply does not change, how has velocity changed?

44. If GDP now falls back to 1,500 and the money supply falls to 350, what is velocity?

Exchange Rates and International Capital Flows

29

FIGURE 29.1 Trade Around the World Is a trade deficit between the United States and the European Union good or bad for the U.S. economy? (Credit: modification of "US Dollar banknotes" by Milad Mosapoor/Wikimedia Commons, Public Domain)

CHAPTER OBJECTIVES

In this chapter, you will learn about:

- How the Foreign Exchange Market Works
- Demand and Supply Shifts in Foreign Exchange Markets
- Macroeconomic Effects of Exchange Rates
- Exchange Rate Policies

Introduction to Exchange Rates and International Capital Flows

BRING IT HOME

Is a Stronger Dollar Good for the U.S. Economy?

From 2002 to 2008, the U.S. dollar lost more than a quarter of its value in foreign currency markets. On January 1, 2002, one dollar was worth 1.11 euros. On April 24, 2008 it hit its lowest point with a dollar being worth 0.64 euros. During this period, the trade deficit between the United States and the European Union grew from a yearly total of approximately 85.7 billion dollars in 2002 to 95.8 billion dollars in 2008. Was this a good thing or a bad thing for the U.S. economy?

We live in a global world. U.S. consumers buy trillions of dollars worth of imported goods and services each year, not just from the European Union, but from all over the world. U.S. businesses sell trillions of dollars' worth of exports. U.S. citizens, businesses, and governments invest trillions of dollars abroad every year. Foreign investors,

businesses, and governments invest trillions of dollars in the United States each year. Indeed, foreigners are a major buyer of U.S. federal debt.

Many people feel that a weaker dollar is bad for America, that it's an indication of a weak economy, but is it? This chapter will help answer that question.

The world has over 150 different currencies, from the Afghanistan afghani and the Albanian lek all the way through the alphabet to the Zambian kwacha and the Zimbabwean dollar. For international economic transactions, households or firms will wish to exchange one currency for another. Perhaps the need for exchanging currencies will come from a German firm that exports products to Russia, but then wishes to exchange the Russian rubles it has earned for euros, so that the firm can pay its workers and suppliers in Germany. Perhaps it will be a South African firm that wishes to purchase a mining operation in Angola, but to make the purchase it must convert South African rand to Angolan kwanza. Perhaps it will be an American tourist visiting China, who wishes to convert U.S. dollars to Chinese yuan to pay the hotel bill.

Exchange rates can sometimes change very swiftly. For example, in the United Kingdom the pound was worth about $1.50 just before the nation voted to leave the European Union (also known as the Brexit vote), in June 2016; the pound fell to $1.37 just after the vote and continued falling to reach 30-year lows a few months later. For firms engaged in international buying, selling, lending, and borrowing, these swings in exchange rates can have an enormous effect on profits.

This chapter discusses the international dimension of money, which involves conversions from one currency to another at an exchange rate. An exchange rate is nothing more than a price—that is, the price of one currency in terms of another currency—and so we can analyze it with the tools of supply and demand. The first module of this chapter begins with an overview of foreign exchange markets: their size, their main participants, and the vocabulary for discussing movements of exchange rates. The following module uses demand and supply graphs to analyze some of the main factors that cause shifts in exchange rates. A final module then brings the central bank and monetary policy back into the picture. Each country must decide whether to allow the market to determine its exchange rate, or have the central bank intervene. All the choices for exchange rate policy involve distinctive tradeoffs and risks.

29.1 How the Foreign Exchange Market Works

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Define "foreign exchange market"
- Describe different types of investments like foreign direct investments (FDI), portfolio investments, and hedging
- Explain how appreciating or depreciating currency affects exchange rates
- Identify who benefits from a stronger currency and benefits from a weaker currency

Most countries have different currencies, but not all. Sometimes small economies use an economically larger neighbor's currency. For example, Ecuador, El Salvador, and Panama have decided to **dollarize**—that is, to use the U.S. dollar as their currency. Sometimes nations share a common currency. A large-scale example of a common currency is the decision by 17 European nations—including some very large economies such as France, Germany, and Italy—to replace their former currencies with the euro at the start of 1999. With these exceptions, most of the international economy takes place in a situation of multiple national currencies in which both people and firms need to convert from one currency to another when selling, buying, hiring, borrowing, traveling, or investing across national borders. We call the market in which people or firms use one currency to purchase another currency the **foreign exchange market**.

You have encountered the basic concept of exchange rates in earlier chapters. In The International Trade and Capital Flows, for example, we discussed how economists use exchange rates to compare GDP statistics from

countries where they measure GDP in different currencies. These earlier examples, however, took the actual exchange rate as given, as if it were a fact of nature. In reality, the exchange rate is a price—the price of one currency expressed in terms of units of another currency. The key framework for analyzing prices, whether in this course, any other economics course, in public policy, or business examples, is the operation of supply and demand in markets.

LINK IT UP

Visit this website (http://openstax.org/l/exratecalc) for an exchange rate calculator.

The Extraordinary Size of the Foreign Exchange Markets

If you travel to a foreign country that uses a different currency, you will undoubtedly need to make a trip to a bank or foreign currency office to exchange whatever currency you're holding for that country's currency. Even though this is a simple transaction, it is part of a very large market. The quantities traded in foreign exchange markets are breathtaking. A 2019 Bank of International Settlements survey found that $5.3 trillion *per day* was traded on foreign exchange markets, which makes the foreign exchange market the largest market in the world economy. In contrast, 2019 U.S. real GDP was $21.4 trillion *per year*.

Your transaction is simple enough. Suppose you carry a $100 bill. You bring it into the foreign currency office and look up, and you see a bunch of different numbers on a digital board. For example, if you are traveling to Turkey, whose national currency is the Turkish Lira, one line of the board might read: "U.S. DOLLARS: BUY 5.50; SELL 5.80." This means that the office will give you 5.50 Turkish Lira in exchange for 1 U.S. dollar. If you have $100, the office will give you 550 Turkish Lira. If you want to *sell* Turkish Lira for U.S. dollars, the office will surely buy them from you, but not at the same exchange rate, since the office will make some money on the exchange. So if you bring 550 Turkish Lira and ask for U.S. dollars, it will not give you 100 dollars, but instead about $95. The important point is that this one transaction, when repeated all over the world for all sorts of different transactions, ends up totaling $6.6 trillion worth of exchanges per day.

Table 29.1 shows the currencies most commonly traded on foreign exchange markets. The U.S. dollar dominates the foreign exchange market, being on one side of 88.3% of all foreign exchange transactions. The U.S. dollar is followed by the euro, the British pound, the Australian dollar, and the Japanese yen.

Currency	% Daily Share
U.S. dollar	88.3%
Euro	32.3%
Japanese yen	16.8%
British pound	12.8%
Australian dollar	6.8%

TABLE 29.1 Currencies Traded Most on Foreign Exchange Markets as of September, 2019 The "% Daily Share" shows the percentage of transactions where the currency is on one side of the exchange. (Source: https://www.bis.org/statistics/rpfx19_fx.pdf)

Currency	% Daily Share
Canadian dollar	5.0%
Swiss franc	5.0%
Chinese yuan	4.3%

TABLE 29.1 Currencies Traded Most on Foreign Exchange Markets as of September, 2019 The "% Daily Share" shows the percentage of transactions where the currency is on one side of the exchange. (Source: https://www.bis.org/statistics/rpfx19_fx.pdf)

Demanders and Suppliers of Currency in Foreign Exchange Markets

In foreign exchange markets, demand and supply become closely interrelated, because a person or firm who demands one currency must at the same time supply another currency—and vice versa. To get a sense of this, it is useful to consider four groups of people or firms who participate in the market: (1) firms that are involved in international trade of goods and services; (2) tourists visiting other countries; (3) international investors buying ownership (or part-ownership) of a foreign firm; (4) international investors making financial investments that do not involve ownership. Let's consider these categories in turn.

Firms that buy and sell on international markets find that their costs for workers, suppliers, and investors are measured in the currency of the nation where their production occurs, but their revenues from sales are measured in the currency of the different nation where their sales happened. Thus, a Chinese firm exporting abroad will earn some other currency—say, U.S. dollars—but will need Chinese yuan to pay the workers, suppliers, and investors who are based in China. In the foreign exchange markets, this firm will be a supplier of U.S. dollars and a demander of Chinese yuan.

International tourists will supply their home currency to receive the currency of the country they are visiting. For example, an American tourist who is visiting China will supply U.S. dollars into the foreign exchange market and demand Chinese yuan.

We often divide financial investments that cross international boundaries, and require exchanging currency into two categories. **Foreign direct investment (FDI)** refers to purchasing a firm (at least ten percent) in another country or starting up a new enterprise in a foreign country For example, in 2008 the Belgian beer-brewing company InBev bought the U.S. beer-maker Anheuser-Busch for $52 billion. To make this purchase, InBev would have to supply euros (the currency of Belgium) to the foreign exchange market and demand U.S. dollars.

The other kind of international financial investment, **portfolio investment**, involves a purely financial investment that does not entail any management responsibility. An example would be a U.S. financial investor who purchased U.K. government bonds, or deposited money in a British bank. To make such investments, the American investor would supply U.S. dollars in the foreign exchange market and demand British pounds.

Business people often link portfolio investment to expectations about how exchange rates will shift. Look at a U.S. financial investor who is considering purchasing U.K. issued bonds. For simplicity, ignore any bond interest payment (which will be small in the short run anyway) and focus on exchange rates. Say that a British pound is currently worth $1.50 in U.S. currency. However, the investor believes that in a month, the British

pound will be worth $1.60 in U.S. currency. Thus, as Figure 29.2 (a) shows, this investor would change $24,000 for 16,000 British pounds. In a month, if the pound is worth $1.60, then the portfolio investor can trade back to U.S. dollars at the new exchange rate, and have $25,600—a nice profit. A portfolio investor who believes that the foreign exchange rate for the pound will work in the opposite direction can also invest accordingly. Say that an investor expects that the pound, now worth $1.50 in U.S. currency, will decline to $1.40. Then, as Figure 29.2 (b) shows, that investor could start off with £20,000 in British currency (borrowing the money if necessary), convert it to $30,000 in U.S. currency, wait a month, and then convert back to approximately £21,429 in British currency—again making a nice profit. Of course, this kind of investing comes without guarantees, and an investor will suffer losses if the exchange rates do not move as predicted.

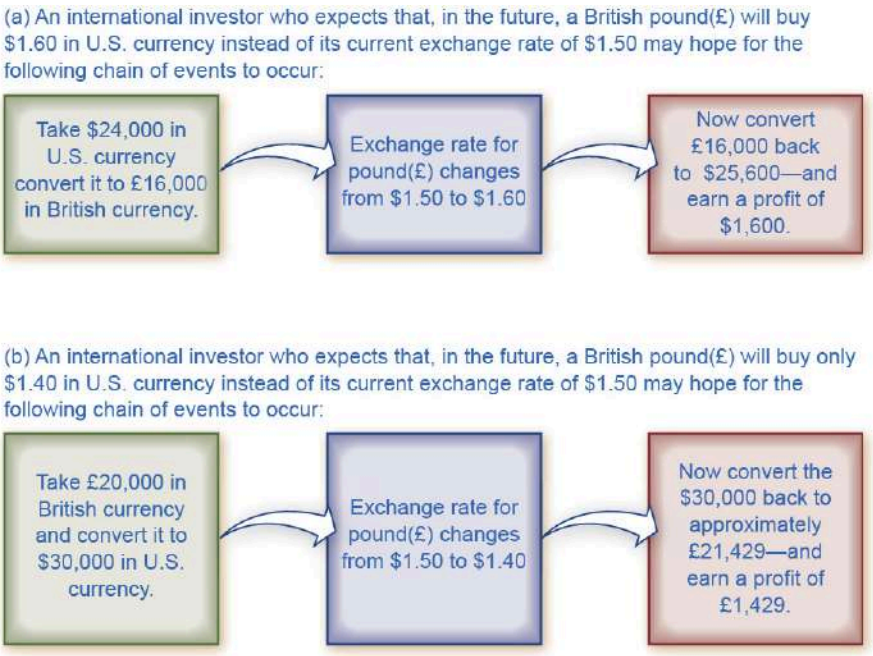


FIGURE 29.2 A Portfolio Investor Trying to Benefit from Exchange Rate Movements Expectations of a currency's future value can drive its demand and supply in foreign exchange markets.

Many portfolio investment decisions are not as simple as betting that the currency's value will change in one direction or the other. Instead, they involve firms trying to protect themselves from movements in exchange rates. Imagine you are running a U.S. firm that is exporting to France. You have signed a contract to deliver certain products and will receive 1 million euros a year from now. However, you do not know how much this contract will be worth in U.S. dollars, because the dollar/euro exchange rate can fluctuate in the next year. Let's say you want to know for sure what the contract will be worth, and not take a risk that the euro will be worth less in U.S. dollars than it currently is. You can **hedge**, which means using a financial transaction to protect yourself against a risk from one of your investments (in this case, currency risk from the contract). Specifically, you can sign a financial contract and pay a fee that guarantees you a certain exchange rate one year from now—regardless of what the market exchange rate is at that time. Now, it is possible that the euro will be worth more in dollars a year from now, so your hedging contract will be unnecessary, and you will have paid a fee for nothing. However, if the value of the euro in dollars declines, then you are protected by the hedge. When parties wish to enter financial contracts like hedging, they normally rely on a financial institution or brokerage company to handle the hedging. These companies either take a fee or create a spread in the exchange rate in order to earn money through the service they provide.

Both foreign direct investment and portfolio investment involve an investor who supplies domestic currency and demands a foreign currency. With portfolio investment, the client purchases less than ten percent of a company. As such, business players often get involved with portfolio investment with a short term focus. With foreign direct investment the investor purchases more than ten percent of a company and the investor

typically assumes some managerial responsibility. Thus, foreign direct investment tends to have a more long-run focus. As a practical matter, an investor can withdraw portfolio investments from a country much more quickly than foreign direct investments. A U.S. portfolio investor who wants to buy or sell U.K. government bonds can do so with a phone call or a few computer keyboard clicks. However, a U.S. firm that wants to buy or sell a company, such as one that manufactures automobile parts in the United Kingdom, will find that planning and carrying out the transaction takes a few weeks, even months. Table 29.2 summarizes the main categories of currency demanders and suppliers.

Demand for the U.S. Dollar Comes from...	Supply of the U.S. Dollar Comes from...
A U.S. exporting firm that earned foreign currency and is trying to pay U.S.-based expenses	A foreign firm that has sold imported goods in the United States, earned U.S. dollars, and is trying to pay expenses incurred in its home country
Foreign tourists visiting the United States	U.S. tourists leaving to visit other countries
Foreign investors who wish to make direct investments in the U.S. economy	U.S. investors who want to make foreign direct investments in other countries
Foreign investors who wish to make portfolio investments in the U.S. economy	U.S. investors who want to make portfolio investments in other countries

TABLE 29.2 The Demand and Supply Line-ups in Foreign Exchange Markets

Participants in the Exchange Rate Market

The foreign exchange market does not involve the ultimate suppliers and demanders of foreign exchange literally seeking each other. If Martina decides to leave her home in Venezuela and take a trip in the United States, she does not need to find a U.S. citizen who is planning to take a vacation in Venezuela and arrange a person-to-person currency trade. Instead, the foreign exchange market works through financial institutions, and it operates on several levels.

Most people and firms who are exchanging a substantial quantity of currency go to a bank, and most banks provide foreign exchange as a service to customers. These banks (and a few other firms), known as dealers, then trade the foreign exchange. This is called the interbank market.

In the world economy, roughly 2,000 firms are foreign exchange dealers. The U.S. economy has less than 100 foreign exchange dealers, but the largest 12 or so dealers carry out more than half the total transactions. The foreign exchange market has no central location, but the major dealers keep a close watch on each other at all times.

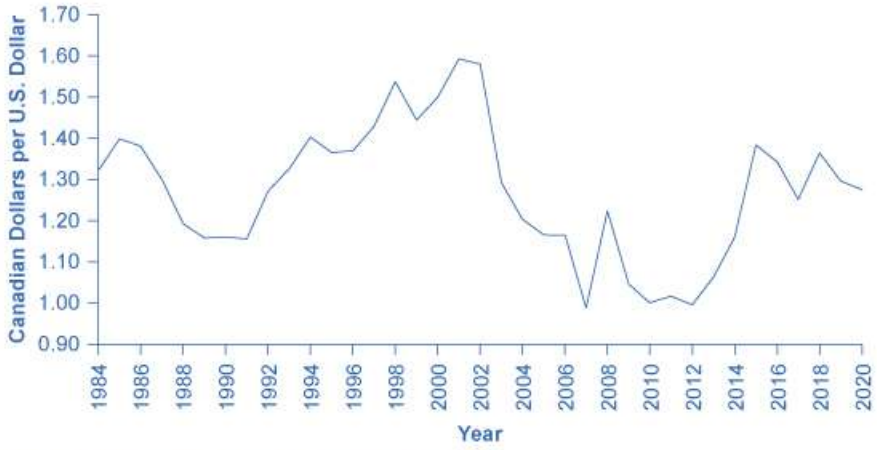
The foreign exchange market is huge not because of the demands of tourists, firms, or even foreign direct investment, but instead because of portfolio investment and the actions of interlocking foreign exchange dealers. International tourism is a very large industry, involving about $1 trillion per year. Global exports are about 23.5% of global GDP or about $19 trillion per year. Foreign direct investment totaled about $870 billion in the end of 2021. These quantities are dwarfed, however, by the $6.6 trillion *per day* traded in foreign exchange markets. Most transactions in the foreign exchange market are for portfolio investment—relatively short-term movements of financial capital between currencies—and because of the large foreign exchange dealers' actions as they constantly buy and sell with each other.

Strengthening and Weakening Currency

When the prices of most goods and services change, the price "rises or "falls". For exchange rates, the terminology is different. When the exchange rate for a currency rises, so that the currency exchanges for more

of other currencies, we refer to it as **appreciating** or "strengthening." When the exchange rate for a currency falls, so that a currency trades for less of other currencies, we refer to it as **depreciating** or "weakening."

To illustrate the use of these terms, consider the exchange rate between the U.S. dollar and the Canadian dollar since 1980, in Figure 29.3 (a). The vertical axis in Figure 29.3 (a) shows the price of $1 in U.S. currency, measured in terms of Canadian currency. Clearly, exchange rates can move up and down substantially. A U.S. dollar traded for $1.17 Canadian in 1980. The U.S. dollar appreciated or strengthened to $1.39 Canadian in 1986, depreciated or weakened to $1.15 Canadian in 1991, and then appreciated or strengthened to $1.60 Canadian by early in 2002, fell to roughly $1.20 Canadian in 2009, and then had a sharp spike up and decline in 2009 and 2010. In August 2022, the U.S. dollar stood at $1.28 Canadian. The units in which we measure exchange rates can be confusing, because we measure the exchange rate of the U.S. dollar exchange using a different currency—the Canadian dollar. However, exchange rates always measure the price of one unit of currency by using a different currency.



(a) U.S. dollar exchange rate in Canadian dollars

(b) Canadian dollar exchange rate in U.S. dollars

FIGURE 29.3 Strengthen or Appreciate vs. Weaken or Depreciate Exchange rates tend to fluctuate substantially, even between bordering companies such as the United States and Canada. By looking closely at the time values (the years vary slightly on these graphs), it is clear that the values in part (a) are a mirror image of part (b), which demonstrates that the depreciation of one currency correlates to the appreciation of the other and vice versa. This means that when comparing the exchange rates between two countries (in this case, the United States and Canada), the depreciation (or weakening) of one country (the U.S. dollar for this example) indicates the appreciation (or

strengthening) of the other currency (which in this example is the Canadian dollar). (Source: Federal Reserve Economic Data (FRED) https://research.stlouisfed.org/fred2/series/EXCAUS)

In looking at the exchange rate between two currencies, the appreciation or strengthening of one currency must mean the depreciation or weakening of the other. Figure 29.3 (b) shows the exchange rate for the Canadian dollar, measured in terms of U.S. dollars. The exchange rate of the U.S. dollar measured in Canadian dollars, in Figure 29.3 (a), is a perfect mirror image with the Canadian dollar exchange rate measured in U.S. dollars, in Figure 29.3 (b). A fall in the Canada $/U.S. $ ratio means a rise in the U.S. $/Canada $ ratio, and vice versa.

Click to view content (https://openstax.org/books/principles-economics-3e/pages/29-1-how-the-foreign-exchange-market-works)
Canadian Dollars per 1 U.S. Dollar.

With the price of a typical good or service, it is clear that higher prices benefit sellers and hurt buyers, while lower prices benefit buyers and hurt sellers. In the case of exchange rates, where the buyers and sellers are not always intuitively obvious, it is useful to trace how a stronger or weaker currency will affect different market participants. Consider, for example, the impact of a stronger U.S. dollar on six different groups of economic actors, as Figure 29.4 shows: (1) U.S. exporters selling abroad; (2) foreign exporters (that is, firms selling imports in the U.S. economy); (3) U.S. tourists abroad; (4) foreign tourists visiting the United States; (5) U.S. investors (either foreign direct investment or portfolio investment) considering opportunities in other countries; (6) and foreign investors considering opportunities in the U.S. economy.

FIGURE 29.4 How Do Exchange Rate Movements Affect Each Group? Exchange rate movements affect exporters, tourists, and international investors in different ways.

For a U.S. firm selling abroad, a stronger U.S. dollar is a curse. A strong U.S. dollar means that foreign currencies are correspondingly weak. When this exporting firm earns foreign currencies through its export sales, and then converts them back to U.S. dollars to pay workers, suppliers, and investors, the stronger dollar means that the foreign currency buys fewer U.S. dollars than if the currency had not strengthened, and that the firm's profits (as measured in dollars) fall. As a result, the firm may choose to reduce its exports, or it may raise its selling price, which will also tend to reduce its exports. In this way, a stronger currency reduces a country's exports.

Conversely, for a foreign firm selling in the U.S. economy, a stronger dollar is a blessing. Each dollar earned through export sales, when traded back into the exporting firm's home currency, will now buy more home currency than expected before the dollar had strengthened. As a result, the stronger dollar means that the

importing firm will earn higher profits than expected. The firm will seek to expand its sales in the U.S. economy, or it may reduce prices, which will also lead to expanded sales. In this way, a stronger U.S. dollar means that consumers will purchase more from foreign producers, expanding the country's level of imports.

For a U.S. tourist abroad, who is exchanging U.S. dollars for foreign currency as necessary, a stronger U.S. dollar is a benefit. The tourist receives more foreign currency for each U.S. dollar, and consequently the cost of the trip in U.S. dollars is lower. When a country's currency is strong, it is a good time for citizens of that country to tour abroad. Imagine a U.S. tourist who has saved up $5,000 for a trip to South Africa. In February 2018, $1 bought 11.9 South African rand, so the tourist had 59,500 rand to spend. By 2018, $1 bought 14.5 rand, which for the tourist translates to 72,500 rand. For foreign visitors to the United States, the opposite pattern holds true. A relatively stronger U.S. dollar means that their own currencies are relatively weaker, so that as they shift from their own currency to U.S. dollars, they have fewer U.S. dollars than previously. When a country's currency is strong, it is not an especially good time for foreign tourists to visit.

A stronger dollar injures the prospects of a U.S. financial investor who has already invested money in another country. A U.S. financial investor abroad must first convert U.S. dollars to a foreign currency, invest in a foreign country, and then later convert that foreign currency back to U.S. dollars. If in the meantime the U.S. dollar becomes stronger and the foreign currency becomes weaker, then when the investor converts back to U.S. dollars, the rate of return on that investment will be less than originally expected at the time it was made.

However, a stronger U.S. dollar boosts the returns of a foreign investor putting money into a U.S. investment. That foreign investor converts from the home currency to U.S. dollars and seeks a U.S. investment, while later planning to switch back to the home currency. If, in the meantime, the dollar grows stronger, then when the time comes to convert from U.S. dollars back to the foreign currency, the investor will receive more foreign currency than expected at the time the original investment was made.

The preceding paragraphs all focus on the case where the U.S. dollar becomes stronger. The first column in Figure 29.4 illustrates the corresponding happy or unhappy economic reactions. The following Work It Out feature centers the analysis on the opposite: a weaker dollar.

WORK IT OUT

Effects of a Weaker Dollar

Let's work through the effects of a weaker dollar on a U.S. exporter, a foreign exporter into the United States, a U.S. tourist going abroad, a foreign tourist coming to the United States, a U.S. investor abroad, and a foreign investor in the United States.

Step 1. Note that the demand for U.S. exports is a function of the price of those exports, which depends on the dollar price of those goods and the exchange rate of the dollar in terms of foreign currency. For example, a Ford pickup truck costs $25,000 in the United States. When it is sold in the United Kingdom, the price is $25,000 / $1.30 per British pound, or £19,231. The dollar affects the price foreigners face who may purchase U.S. exports.

Step 2. Consider that, if the dollar weakens, the pound rises in value. If the pound rises to $2.00 per pound, then the price of a Ford pickup is now $25,000 / $2.00 = £12,500. A weaker dollar means the foreign currency buys more dollars, which means that U.S. exports appear less expensive.

Step 3. Summarize that a weaker U.S. dollar leads to an increase in U.S. exports. For a foreign exporter, the outcome is just the opposite.

Step 4. Suppose a brewery in England is interested in selling its Bass Ale to a grocery store in the United States. If the price of a six pack of Bass Ale is £6.00 and the exchange rate is $1.30 per British pound, the price for the grocery store is 6.00 × $1.30 = $7.80 per six pack. If the dollar weakens to $2.00 per pound, the price of Bass Ale is now 6.00 × $2.00 = $12.

Step 5. Summarize that, from the perspective of U.S. purchasers, a weaker dollar means that foreign currency is more expensive, which means that foreign goods are more expensive also. This leads to a decrease in U.S. imports, which is bad for the foreign exporter.

Step 6. Consider U.S. tourists going abroad. They face the same situation as a U.S. importer—they are purchasing a foreign trip. A weaker dollar means that their trip will cost more, since a given expenditure of foreign currency (e.g., hotel bill) will take more dollars. The result is that the tourist may not stay as long abroad, and some may choose not to travel at all.

Step 7. Consider that, for the foreign tourist to the United States, a weaker dollar is a boon. It means their currency goes further, so the cost of a trip to the United States will be less. Foreigners may choose to take longer trips to the United States, and more foreign tourists may decide to take U.S. trips.

Step 8. Note that a U.S. investor abroad faces the same situation as a U.S. importer—they are purchasing a foreign asset. A U.S. investor will see a weaker dollar as an increase in the "price" of investment, since the same number of dollars will buy less foreign currency and thus less foreign assets. This should decrease the amount of U.S. investment abroad.

Step 9. Note also that foreign investors in the Unites States will have the opposite experience. Since foreign currency buys more dollars, they will likely invest in more U.S. assets.

At this point, you should have a good sense of the major players in the foreign exchange market: firms involved in international trade, tourists, international financial investors, banks, and foreign exchange dealers. The next module shows how players can use the tools of demand and supply in foreign exchange markets to explain the underlying causes of stronger and weaker currencies (we address "stronger" and "weaker" more in the following Clear It Up feature).

CLEAR IT UP

Why is a stronger currency not necessarily better?

One common misunderstanding about exchange rates is that a "stronger" or "appreciating" currency must be better than a "weaker" or "depreciating" currency. After all, is it not obvious that "strong" is better than "weak"? Do not let the terminology confuse you. When a currency becomes stronger, so that it purchases more of other currencies, it benefits some in the economy and injures others. Stronger currency is not necessarily better, it is just different.

29.2 Demand and Supply Shifts in Foreign Exchange Markets

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Explain supply and demand for exchange rates
- Define arbitrage
- Explain purchasing power parity's importance when comparing countries.

The foreign exchange market involves firms, households, and investors who demand and supply currencies coming together through their banks and the key foreign exchange dealers. Figure 29.5 (a) offers an example for the exchange rate between the U.S. dollar and the Mexican peso. The vertical axis shows the exchange rate for U.S. dollars, which in this case is measured in pesos. The horizontal axis shows the quantity of U.S. dollars traded in the foreign exchange market each day. The demand curve (D) for U.S. dollars intersects with the supply curve (S) of U.S. dollars at the equilibrium point (E), which is an exchange rate of 10 pesos per dollar and a total volume of $8.5 billion.

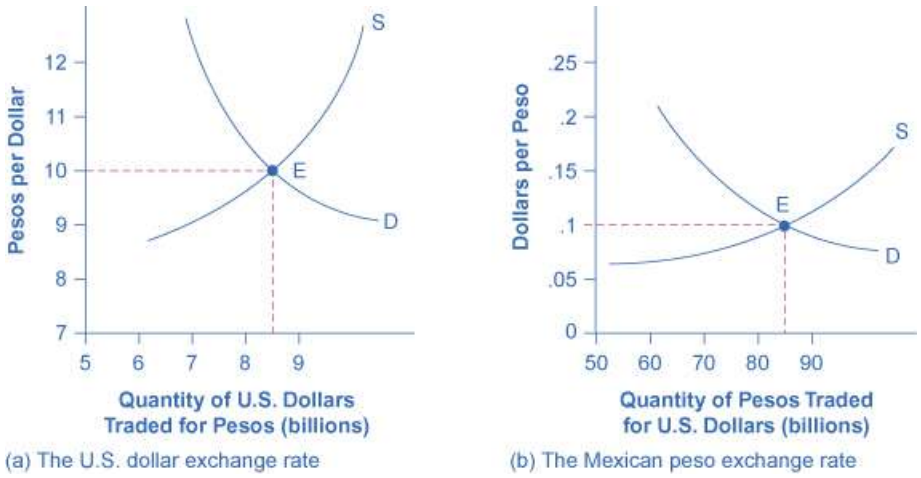


FIGURE 29.5 Demand and Supply for the U.S. Dollar and Mexican Peso Exchange Rate (a) The quantity measured on the horizontal axis is in U.S. dollars, and the exchange rate on the vertical axis is the price of U.S. dollars measured in Mexican pesos. (b) The quantity measured on the horizontal axis is in Mexican pesos, while the price on the vertical axis is the price of pesos measured in U.S. dollars. In both graphs, the equilibrium exchange rate occurs at point E, at the intersection of the demand curve (D) and the supply curve (S).

Figure 29.5 (b) presents the same demand and supply information from the perspective of the Mexican peso. The vertical axis shows the exchange rate for Mexican pesos, which is measured in U.S. dollars. The horizontal axis shows the quantity of Mexican pesos traded in the foreign exchange market. The demand curve (D) for Mexican pesos intersects with the supply curve (S) of Mexican pesos at the equilibrium point (E), which is an exchange rate of 10 cents in U.S. currency for each Mexican peso and a total volume of 85 billion pesos. Note that the two exchange rates are inverses: 10 pesos per dollar is the same as 10 cents per peso (or $0.10 per peso). In the actual foreign exchange market, almost all of the trading for Mexican pesos is for U.S. dollars. What factors would cause the demand or supply to shift, thus leading to a change in the equilibrium exchange rate? We discuss the answer to this question in the following section.

Expectations about Future Exchange Rates

One reason to demand a currency on the foreign exchange market is the belief that the currency's value is about to increase. One reason to supply a currency—that is, sell it on the foreign exchange market—is the expectation that the currency's value is about to decline. For example, imagine that a leading business newspaper, like the *Wall Street Journal* or the *Financial Times*, runs an article predicting that the Mexican peso will appreciate in value. Figure 29.6 illustrates the likely effects of such an article. Demand for the Mexican peso shifts to the right, from D_0 to D_1, as investors become eager to purchase pesos. Conversely, the supply of pesos shifts to the left, from S_0 to S_1, because investors will be less willing to give them up. The result is that the equilibrium exchange rate rises from 10 cents/peso to 12 cents/peso and the equilibrium exchange rate rises from 85 billion to 90 billion pesos as the equilibrium moves from E_0 to E_1.

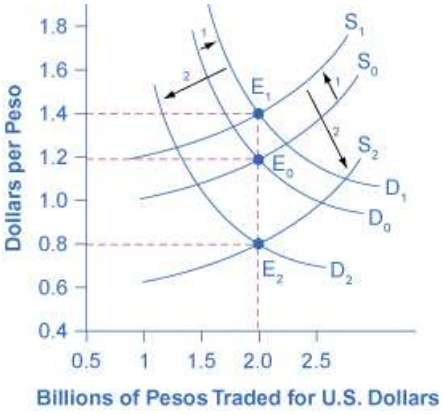


FIGURE 29.6 Exchange Rate Market for Mexican Peso Reacts to Expectations about Future Exchange Rates An announcement that the peso exchange rate is likely to strengthen in the future will lead to greater demand for the peso in the present from investors who wish to benefit from the appreciation. Similarly, it will make investors less likely to supply pesos to the foreign exchange market. Both the shift of demand to the right and the shift of supply to the left cause an immediate appreciation in the exchange rate.

Figure 29.6 also illustrates some peculiar traits of supply and demand diagrams in the foreign exchange market. In contrast to all the other cases of supply and demand you have considered, in the foreign exchange market, supply and demand typically both move at the same time. Groups of participants in the foreign exchange market like firms and investors include some who are buyers and some who are sellers. An expectation of a future shift in the exchange rate affects both buyers and sellers—that is, it affects both demand and supply for a currency.

The shifts in demand and supply curves both cause the exchange rate to shift in the same direction. In this example, they both make the peso exchange rate stronger. However, the shifts in demand and supply work in opposing directions on the quantity traded. In this example, the rising demand for pesos is causing the quantity to rise while the falling supply of pesos is causing quantity to fall. In this specific example, the result is a higher quantity. However, in other cases, the result could be that quantity remains unchanged or declines.

This example also helps to explain why exchange rates often move quite substantially in a short period of a few weeks or months. When investors expect a country's currency to strengthen in the future, they buy the currency and cause it to appreciate immediately. The currency's appreciation can lead other investors to believe that future appreciation is likely—and thus lead to even further appreciation. Similarly, a fear that a currency *might* weaken quickly leads to an *actual* weakening of the currency, which often reinforces the belief that the currency will weaken further. Thus, beliefs about the future path of exchange rates can be self-reinforcing, at least for a time, and a large share of the trading in foreign exchange markets involves dealers trying to outguess each other on what direction exchange rates will move next.

Differences across Countries in Rates of Return

The motivation for investment, whether domestic or foreign, is to earn a return. If rates of return in a country look relatively high, then that country will tend to attract funds from abroad. Conversely, if rates of return in a country look relatively low, then funds will tend to flee to other economies. Changes in the expected rate of return will shift demand and supply for a currency. For example, imagine that interest rates rise in the United States as compared with Mexico. Thus, financial investments in the United States promise a higher return than previously. As a result, more investors will demand U.S. dollars so that they can buy interest-bearing assets and fewer investors will be willing to supply U.S. dollars to foreign exchange markets. Demand for the U.S. dollar will shift to the right, from D_0 to D_1, and supply will shift to the left, from S_0 to S_1, as Figure 29.7 shows. The new equilibrium (E_1), will occur at an exchange rate of nine pesos/dollar and the same quantity of $8.5 billion. Thus, a higher interest rate or rate of return relative to other countries leads a nation's currency to appreciate or strengthen, and a lower interest rate relative to other countries leads a nation's currency to

depreciate or weaken. Since a nation's central bank can use monetary policy to affect its interest rates, a central bank can also cause changes in exchange rates—a connection that we will discuss in more detail later in this chapter.

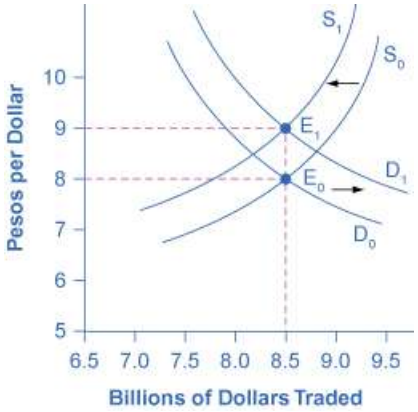


FIGURE 29.7 **Exchange Rate Market for U.S. Dollars Reacts to Higher Interest Rates** A higher rate of return for U.S. dollars makes holding dollars more attractive. Thus, the demand for dollars in the foreign exchange market shifts to the right, from D_0 to D_1, while the supply of dollars shifts to the left, from S_0 to S_1. The new equilibrium (E_1) has a stronger exchange rate than the original equilibrium (E_0), but in this example, the equilibrium quantity traded does not change.

Relative Inflation

If a country experiences a relatively high inflation rate compared with other economies, then the buying power of its currency is eroding, which will tend to discourage anyone from wanting to acquire or to hold the currency. Figure 29.8 shows an example based on an actual episode concerning the Mexican peso. In 1986–87, Mexico experienced an inflation rate of over 200%. Not surprisingly, as inflation dramatically decreased the peso's purchasing power in Mexico. The peso's exchange rate value declined as well. Figure 29.8 shows that the demand for the peso on foreign exchange markets decreased from D_0 to D_1, while the peso's supply increased from S_0 to S_1. The equilibrium exchange rate fell from \$2.50 per peso at the original equilibrium (E_0) to \$0.50 per peso at the new equilibrium (E_1). In this example, the quantity of pesos traded on foreign exchange markets remained the same, even as the exchange rate shifted.

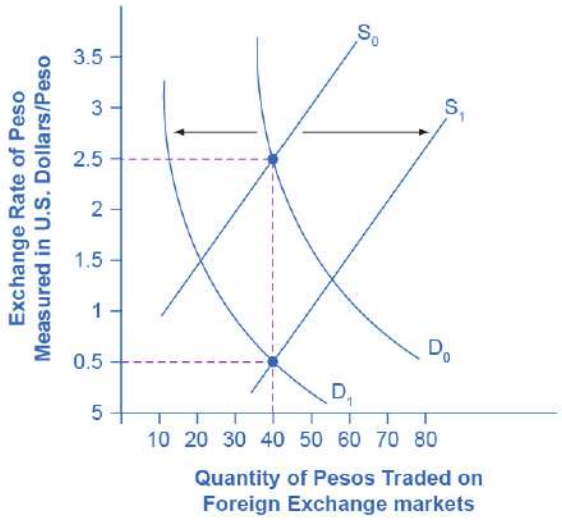


FIGURE 29.8 **Exchange Rate Markets React to Higher Inflation** If a currency is experiencing relatively high inflation, then its buying power is decreasing and international investors will be less eager to hold it. Thus, a rise in inflation in the Mexican peso would lead demand to shift from D_0 to D_1, and supply to increase from S_0 to S_1. Both movements

in demand and supply would cause the currency to depreciate. Here, we draw no effect on the quantity traded, but in truth it could be an increase or a decrease, depending on the actual movements of demand and supply.

LINK IT UP

Visit this website (http://openstax.org/l/bigmac) to learn about the Big Mac index.

Purchasing Power Parity

Over the long term, exchange rates must bear some relationship to the currency's buying power in terms of internationally traded goods. If at a certain exchange rate it was much cheaper to buy internationally traded goods—such as oil, steel, computers, and cars—in one country than in another country, businesses would start buying in the cheap country, selling in other countries, and pocketing the profits.

For example, if a U.S. dollar is worth $1.30 in Canadian currency, then a car that sells for $20,000 in the United States should sell for $26,000 in Canada. If the price of cars in Canada were much lower than $26,000, then at least some U.S. car-buyers would convert their U.S. dollars to Canadian dollars and buy their cars in Canada. If the price of cars were much higher than $26,000 in this example, then at least some Canadian buyers would convert their Canadian dollars to U.S. dollars and go to the United States to purchase their cars. This is known as **arbitrage**, the process of buying and selling goods or currencies across international borders at a profit. It may occur slowly, but over time, it will force prices and exchange rates to align so that the price of internationally traded goods is similar in all countries.

We call the exchange rate that equalizes the prices of internationally traded goods across countries the **purchasing power parity (PPP)** exchange rate. A group of economists at the International Comparison Program, run by the World Bank, have calculated the PPP exchange rate for all countries, based on detailed studies of the prices and quantities of internationally tradable goods.

The purchasing power parity exchange rate has two functions. First, economists often use PPP exchange rates for international comparison of GDP and other economic statistics. Imagine that you are preparing a table showing the size of GDP in many countries in several recent years, and for ease of comparison, you are converting all the values into U.S. dollars. When you insert the value for Japan, you need to use a yen/dollar exchange rate. However, should you use the market exchange rate or the PPP exchange rate? Market exchange rates bounce around. In 2014, the exchange rate was 105 yen/dollar, but in late 2015 the U.S. dollar exchange rate versus the yen was 121 yen/dollar. For simplicity, say that Japan's GDP was ¥500 trillion in both 2014 and 2015. If you use the market exchange rates, then Japan's GDP will be $4.8 trillion in 2014 (that is, ¥500 trillion /(¥105/dollar)) and $4.1 trillion in 2015 (that is, ¥500 trillion /(¥121/dollar)).

The misleading appearance of a changing Japanese economy occurs only because we used the market exchange rate, which often has short-run rises and falls. However, PPP exchange rates stay fairly constant and change only modestly, if at all, from year to year.

The second function of PPP is that exchanges rates will often get closer to it as time passes. It is true that in the short and medium run, as exchange rates adjust to relative inflation rates, rates of return, and to expectations about how interest rates and inflation will shift, the exchange rates will often move away from the PPP exchange rate for a time. However, knowing the PPP will allow you to track and predict exchange rate relationships.

29.3 Macroeconomic Effects of Exchange Rates

LEARNING OBJECTIVES

By the end of this section you will be able to:

- Explain how exchange rate shifting influences aggregate demand and supply
- Explain how shifting exchange rates also can influence loans and banks

A central bank will be concerned about the exchange rate for multiple reasons: (1) Movements in the exchange rate will affect the quantity of aggregate demand in an economy; (2) frequent substantial fluctuations in the exchange rate can disrupt international trade and cause problems in a nation's banking system–this may contribute to an unsustainable balance of trade and large inflows of international financial capital, which can set up the economy for a deep recession if international investors decide to move their money to another country. Let's discuss these scenarios in turn.

Exchange Rates, Aggregate Demand, and Aggregate Supply

Foreign trade in goods and services typically involves incurring the costs of production in one currency while receiving revenues from sales in another currency. As a result, movements in exchange rates can have a powerful effect on incentives to export and import, and thus on aggregate demand in the economy as a whole.

For example, in 1999, when the euro first became a currency, its value measured in U.S. currency was $1.16/euro, which dropped to a low of about $0.83/euro in 2000. By the end of 2013, the euro had risen (and the U.S. dollar had correspondingly weakened) to $1.37/euro. However, by the beginning of 2021, the exchange rate was down to $1.12/euro. Consider the situation of a French firm that each year incurs €10 million in costs, and sells its products in the United States for $10 million. At a time in 1999, when this firm converted $10 million back to euros at the exchange rate of $1.06/euro (that is, $10 million × [€1/$1.06]), it received €9.4 million, and suffered a loss. In 2013, when this same firm converted $10 million back to euros at the exchange rate of $1.37/euro (that is, $10 million × [€1 euro/$1.37]), it received approximately €7.3 million and an even larger loss. In the beginning of 2021, with the exchange rate back at $1.12/euro the firm would suffer a loss once again. This example shows how a stronger euro discourages exports by the French firm, because it makes the costs of production in the domestic currency higher relative to the sales revenues earned in another country. From the point of view of the U.S. economy, the example also shows how a weaker U.S. dollar encourages exports.

Since an increase in exports results in more dollars flowing into the economy, and an increase in imports means more dollars are flowing out, it is easy to conclude that exports are "good" for the economy and imports are "bad," but this overlooks the role of exchange rates. If an American consumer buys a Japanese car for $20,000 instead of an American car for $30,000, it may be tempting to argue that the American economy has lost out. However, the Japanese company will have to convert those dollars to yen to pay its workers and operate its factories. Whoever buys those dollars will have to use them to purchase American goods and services, so the money comes right back into the American economy. At the same time, the consumer saves money by buying a less expensive import, and can use the extra money for other purposes.

Fluctuations in Exchange Rates

Exchange rates can fluctuate a great deal in the short run. As yet one more example, the Indian rupee moved from 39 rupees/dollar in February 2008 to 51 rupees/dollar in March 2009, a decline of more than one-fourth in the value of the rupee on foreign exchange markets. Figure 29.9 earlier showed that even two economically developed neighboring economies like the United States and Canada can see significant movements in exchange rates over a few years. For firms that depend on export sales, or firms that rely on imported inputs to production, or even purely domestic firms that compete with firms tied into international trade—which in many countries adds up to half or more of a nation's GDP—sharp movements in exchange rates can lead to dramatic changes in profits and losses. A central bank may desire to keep exchange rates from moving too much as part of providing a stable business climate, where firms can focus on productivity and innovation, not on reacting to exchange rate fluctuations.

One of the most economically destructive effects of exchange rate fluctuations can happen through the banking system. Financial institutions measure most international loans are measured in a few large currencies, like U.S. dollars, European euros, and Japanese yen. In countries that do not use these currencies, banks often borrow funds in the currencies of other countries, like U.S. dollars, but then lend in their own

domestic currency. The left-hand chain of events in Figure 29.9 shows how this pattern of international borrowing can work. A bank in Thailand borrows one million in U.S. dollars. Then the bank converts the dollars to its domestic currency—in the case of Thailand, the currency is the baht—at a rate of 40 baht/dollar. The bank then lends the baht to a firm in Thailand. The business repays the loan in baht, and the bank converts it back to U.S. dollars to pay off its original U.S. dollar loan.

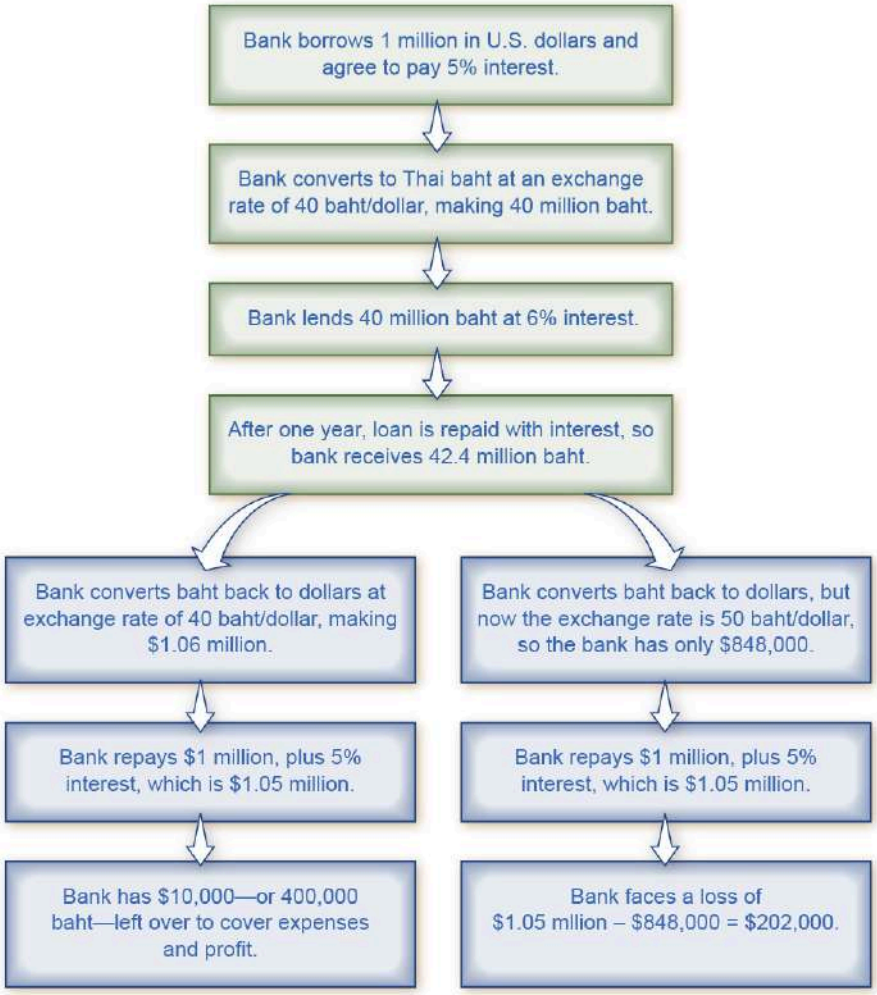


FIGURE 29.9 International Borrowing The scenario of international borrowing that ends on the left is a success story, but the scenario that ends on the right shows what happens when the exchange rate weakens.

This process of borrowing in a foreign currency and lending in a domestic currency can work just fine, as long as the exchange rate does not shift. In the scenario outlined, if the dollar strengthens and the baht weakens, a problem arises. The right-hand chain of events in Figure 29.9 illustrates what happens when the baht unexpectedly weakens from 40 baht/dollar to 50 baht/dollar. The Thai firm still repays the loan in full to the bank. However, because of the shift in the exchange rate, the bank cannot repay its loan in U.S. dollars. (Of course, if the exchange rate had changed in the other direction, making the Thai currency stronger, the bank could have realized an unexpectedly large profit.)

In 1997–1998, countries across eastern Asia, like Thailand, Korea, Malaysia, and Indonesia, experienced a sharp depreciation of their currencies, in some cases 50% or more. These countries had been experiencing substantial inflows of foreign investment capital, with bank lending increasing by 20% to 30% per year through the mid-1990s. When their exchange rates depreciated, the banking systems in these countries were bankrupt. Argentina experienced a similar chain of events in 2002. When the Argentine peso depreciated,

Argentina's banks found themselves unable to pay back what they had borrowed in U.S. dollars.

Banks play a vital role in any economy in facilitating transactions and in making loans to firms and consumers. When most of a country's largest banks become bankrupt simultaneously, a sharp decline in aggregate demand and a deep recession results. Since the main responsibilities of a central bank are to control the money supply and to ensure that the banking system is stable, a central bank must be concerned about whether large and unexpected exchange rate depreciation will drive most of the country's existing banks into bankruptcy. For more on this concern, return to the chapter on The International Trade and Capital Flows.

Summing Up Public Policy and Exchange Rates

Every nation would prefer a stable exchange rate to facilitate international trade and reduce the degree of risk and uncertainty in the economy. However, a nation may sometimes want a weaker exchange rate to stimulate aggregate demand and reduce a recession, or a stronger exchange rate to fight inflation. The country must also be concerned that rapid movements from a weak to a strong exchange rate may hurt its export industries, while rapid movements from a strong to a weak exchange rate can hurt its banking sector. In short, every choice of an exchange rate—whether it should be stronger or weaker, or fixed or changing—represents potential tradeoffs.

29.4 Exchange Rate Policies

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Differentiate among a floating exchange rate, a soft peg, a hard peg, and a merged currency
- Identify the tradeoffs that come with a floating exchange rate, a soft peg, a hard peg, and a merged currency

Exchange rate policies come in a range of different forms listed in Figure 29.10: let the foreign exchange market determine the exchange rate; let the market set the value of the exchange rate most of the time, but have the central bank sometimes intervene to prevent fluctuations that seem too large; have the central bank guarantee a specific exchange rate; or share a currency with other countries. Let's discuss each type of exchange rate policy and its tradeoffs.

FIGURE 29.10 A Spectrum of Exchange Rate Policies A nation may adopt one of a variety of exchange rate regimes, from floating rates in which the foreign exchange market determines the rates to pegged rates where governments intervene to manage the exchange rate's value, to a common currency where the nation adopts another country or group of countries' currency.

Floating Exchange Rates

We refer to a policy which allows the foreign exchange market to set exchange rates as a **floating exchange rate**. The U.S. dollar is a floating exchange rate, as are the currencies of about 40% of the countries in the world economy. The major concern with this policy is that exchange rates can move a great deal in a short time.

Consider the U.S. exchange rate expressed in terms of another fairly stable currency, the Japanese yen, as Figure 29.11 shows. On January 1, 2002, the exchange rate was 133 yen/dollar. On January 1, 2005, it was 103 yen/dollar. On June 1, 2007, it was 122 yen/dollar, on January 1, 2012, it was 77 yen per dollar, and on March 1, 2015, it was 120 yen per dollar. Since 2015, it has dropped again; by the end of December 2020, the exchange

rate stood at 103 yen per dollar. As investor sentiment swings back and forth, driving exchange rates up and down, exporters, importers, and banks involved in international lending are all affected. At worst, large movements in exchange rates can drive companies into bankruptcy or trigger a nationwide banking collapse. However, even in the moderate case of the yen/dollar exchange rate, these movements of roughly 30 percent back and forth impose stress on both economies as firms must alter their export and import plans to take the new exchange rates into account. Especially in smaller countries where international trade is a relatively large share of GDP, exchange rate movements can rattle their economies.

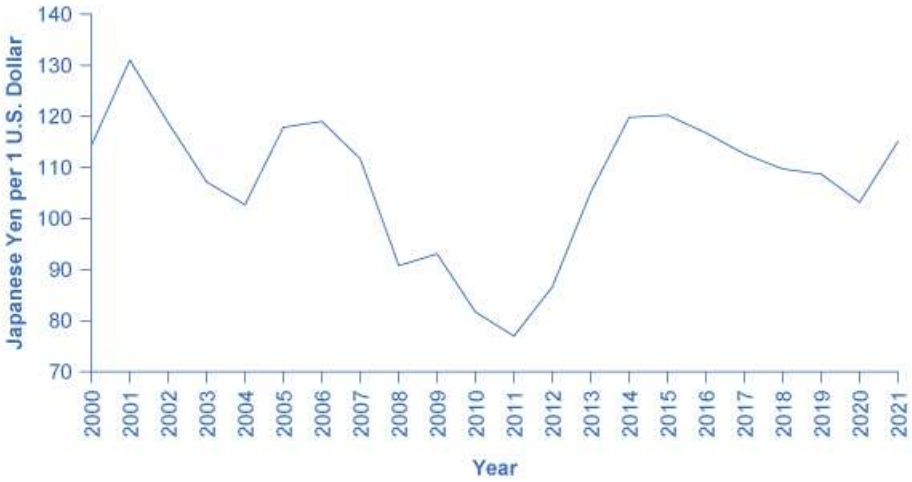


FIGURE 29.11 U.S. Dollar Exchange Rate in Japanese Yen Even seemingly stable exchange rates such as the Japanese Yen to the U.S. Dollar can vary when closely examined over time. This figure shows a relatively stable rate between 2011 and 2013. In 2013, there was a drastic depreciation of the Yen (relative to the U.S. Dollar) by about 14% and again at the end of the year in 2014 also by about 14%. Since then, between 2016 and 2020 there was an appreciation of about 13% from 118 yen per dollar to 103 yen per dollar. (Source: Federal Reserve Economic Data (FRED) https://research.stlouisfed.org/fred2/series/DEXJPUS)

However, movements of floating exchange rates have advantages, too. After all, prices of goods and services rise and fall throughout a market economy, as demand and supply shift. If an economy experiences strong inflows or outflows of international financial capital, or has relatively high inflation, or if it experiences strong productivity growth so that purchasing power changes relative to other economies, then it makes economic sense for the exchange rate to shift as well.

Floating exchange rate advocates often argue that if government policies were more predictable and stable, then inflation rates and interest rates would be more predictable and stable. Exchange rates would bounce around less, too. The economist Milton Friedman (1912–2006), for example, wrote a defense of floating exchange rates in 1962 in his book *Capitalism and Freedom*:

> Being in favor of floating exchange rates does not mean being in favor of unstable exchange rates. When we support a free price system [for goods and services] at home, this does not imply that we favor a system in which prices fluctuate wildly up and down. What we want is a system in which prices are free to fluctuate but in which the forces determining them are sufficiently stable so that in fact prices move within moderate ranges. This is equally true in a system of floating exchange rates. The ultimate objective is a world in which exchange rates, while free to vary, are, in fact, highly stable because basic economic policies and conditions are stable.

Advocates of floating exchange rates admit that, yes, exchange rates may sometimes fluctuate. They point out, however, that if a central bank focuses on preventing either high inflation or deep recession, with low and reasonably steady interest rates, then exchange rates will have less reason to vary.

Using Soft Pegs and Hard Pegs

When a government intervenes in the foreign exchange market so that the currency's exchange rate is different from what the market would have produced, it establishes a "peg" for its currency. A **soft peg** is the name for an exchange rate policy where the government usually allows the market to set exchange rate, but in some cases, especially if the exchange rate seems to be moving rapidly in one direction, the central bank will intervene in the market. With a **hard peg** exchange rate policy, the central bank sets a fixed and unchanging value for the exchange rate. A central bank can implement soft peg and hard peg policies.

Suppose the market exchange rate for the Brazilian currency, the real, would be 35 cents/real with a daily quantity of 15 billion real traded in the market, as the equilibrium E_0 in Figure 29.12 (a) and Figure 29.12 (b) show. However, Brazil's government decides that the exchange rate should be 30 cents/real, as Figure 29.12 (a) shows. Perhaps Brazil sets this lower exchange rate to benefit its export industries. Perhaps it is an attempt to stimulate aggregate demand by stimulating exports. Perhaps Brazil believes that the current market exchange rate is higher than the long-term purchasing power parity value of the real, so it is minimizing fluctuations in the real by keeping it at this lower rate. Perhaps the government set the target exchange rate sometime in the past, and it is now maintaining it for the sake of stability. Whatever the reason, if Brazil's central bank wishes to keep the exchange rate below the market level, it must face the reality that at this weaker exchange rate of 30 cents/real, the quantity demanded of its currency at 17 billion reals is greater than the quantity supplied of 13 billion reals in the foreign exchange market.

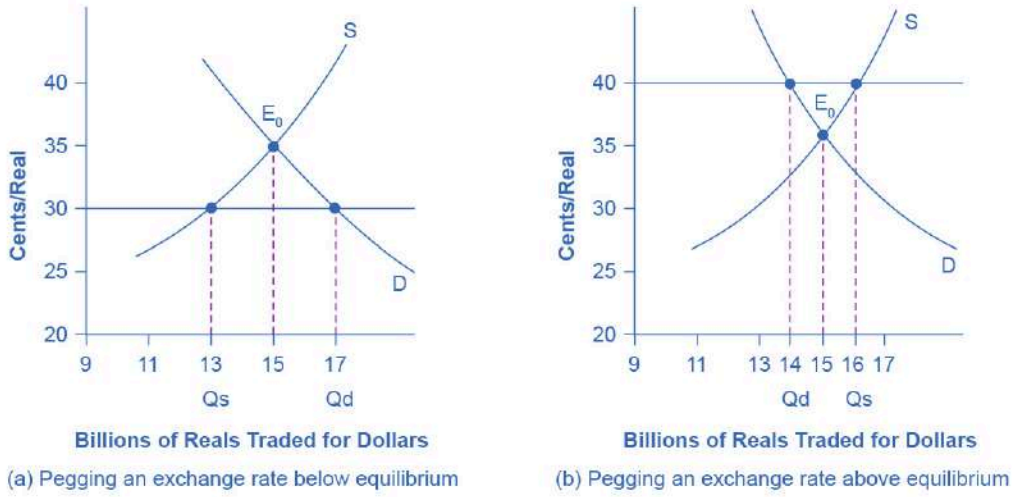


FIGURE 29.12 Pegging an Exchange Rate (a) If an exchange rate is pegged below what would otherwise be the equilibrium, then the currency's quantity demanded will exceed the quantity supplied. (b) If an exchange rate is pegged above what would otherwise be the equilibrium, then the currency's quantity supplied exceeds the quantity demanded.

The Brazilian central bank could weaken its exchange rate in two ways. One approach is to use an expansionary monetary policy that leads to lower interest rates. In foreign exchange markets, the lower interest rates will reduce demand and increase supply of the real and lead to depreciation. Central banks do not use this technique often because lowering interest rates to weaken the currency may be in conflict with the country's monetary policy goals. Alternatively, Brazil's central bank could trade directly in the foreign exchange market. The central bank can expand the money supply by creating reals, use the reals to purchase foreign currencies, and avoid selling any of its own currency. In this way, it can fill the gap between quantity demanded and quantity supplied of its currency.

Figure 29.12 (b) shows the opposite situation. Here, the Brazilian government desires a stronger exchange rate of 40 cents/real than the market rate of 35 cents/real. Perhaps Brazil desires the stronger currency to reduce aggregate demand and to fight inflation, or perhaps Brazil believes that that current market exchange rate is

temporarily lower than the long-term rate. Whatever the reason, at the higher desired exchange rate, the quantity supplied of 16 billion reals exceeds the quantity demanded of 14 billion reals.

Brazil's central bank can use a contractionary monetary policy to raise interest rates, which will increase demand and reduce currency supply on foreign exchange markets, and lead to an appreciation. Alternatively, Brazil's central bank can trade directly in the foreign exchange market. In this case, with an excess supply of its own currency in foreign exchange markets, the central bank must use reserves of foreign currency, like U.S. dollars, to demand its own currency and thus cause an appreciation of its exchange rate.

Both a soft peg and a hard peg policy require that the central bank intervene in the foreign exchange market. However, a hard peg policy attempts to preserve a fixed exchange rate at all times. A soft peg policy typically allows the exchange rate to move up and down by relatively small amounts in the short run of several months or a year, and to move by larger amounts over time, but seeks to avoid extreme short-term fluctuations.

Tradeoffs of Soft Pegs and Hard Pegs

When a country decides to alter the market exchange rate, it faces a number of tradeoffs. If it uses monetary policy to alter the exchange rate, it then cannot at the same time use monetary policy to address issues of inflation or recession. If it uses direct purchases and sales of foreign currencies in exchange rates, then it must face the issue of how it will handle its reserves of foreign currency. Finally, a pegged exchange rate can even create additional movements of the exchange rate. For example, even the possibility of government intervention in exchange rate markets will lead to rumors about whether and when the government will intervene, and dealers in the foreign exchange market will react to those rumors. Let's consider these issues in turn.

One concern with pegged exchange rate policies is that they imply a country's monetary policy is no longer focused on controlling inflation or shortening recessions, but now must also take the exchange rate into account. For example, when a country pegs its exchange rate, it will sometimes face economic situations where it would like to have an expansionary monetary policy to fight recession—but it cannot do so because that policy would depreciate its exchange rate and break its hard peg. With a soft peg exchange rate policy, the central bank can sometimes ignore the exchange rate and focus on domestic inflation or recession—but in other cases the central bank may ignore inflation or recession and instead focus on its soft peg exchange rate. With a hard peg policy, domestic monetary policy is effectively no longer determined by domestic inflation or unemployment, but only by what monetary policy is needed to keep the exchange rate at the hard peg.

Another issue arises when a central bank intervenes directly in the exchange rate market. If a central bank ends up in a situation where it is perpetually creating and selling its own currency on foreign exchange markets, it will be buying the currency of other countries, like U.S. dollars or euros, to hold as reserves. Holding large reserves of other currencies has an opportunity cost, and central banks will not wish to boost such reserves without limit.

In addition, a central bank that causes a large increase in the supply of money is also risking an inflationary surge in aggregate demand. Conversely, when a central bank wishes to buy its own currency, it can do so by using its reserves of international currency like the U.S. dollar or the euro. However, if the central bank runs out of such reserves, it can no longer use this method to strengthen its currency. Thus, buying foreign currencies in exchange rate markets can be expensive and inflationary, while selling foreign currencies can work only until a central bank runs out of reserves.

Yet another issue is that when a government pegs its exchange rate, it may unintentionally create another reason for additional fluctuation. With a soft peg policy, foreign exchange dealers and international investors react to every rumor about how or when the central bank is likely to intervene to influence the exchange rate, and as they react to rumors the exchange rate will shift up and down. Thus, even though the goal of a soft peg policy is to reduce short-term fluctuations of the exchange rate, the existence of the policy—when anticipated in the foreign exchange market—may sometimes increase short-term fluctuations as international investors

try to anticipate how and when the central bank will act. The following Clear It Up feature discusses the effects of **international capital flows**—capital that flows across national boundaries as either portfolio investment or direct investment.

CLEAR IT UP

How do Tobin taxes control the flow of capital?

Some countries like Chile and Malaysia have sought to reduce movements in exchange rates by limiting international financial capital inflows and outflows. The government can enact this policy either through targeted taxes or by regulations.

Taxes on international capital flows are sometimes known as **Tobin taxes**, named after James Tobin, the 1981 Nobel laureate in economics who proposed such a tax in a 1972 lecture. For example, a government might tax all foreign exchange transactions, or attempt to tax short-term portfolio investment while exempting long-term foreign direct investment. Countries can also use regulation to forbid certain kinds of foreign investment in the first place or to make it difficult for international financial investors to withdraw their funds from a country.

The goal of such policies is to reduce international capital flows, especially short-term portfolio flows, in the hope that doing so will reduce the chance of large movements in exchange rates that can bring macroeconomic disaster.

However, proposals to limit international financial flows have severe practical difficulties. National governments impose taxes, not international ones. If one government imposes a Tobin tax on exchange rate transactions carried out within its territory, a firm based someplace like the Grand Caymans, an island nation in the Caribbean well-known for allowing some financial wheeling and dealing might easily operate the exchange rate market. In an interconnected global economy, if goods and services are allowed to flow across national borders, then payments need to flow across borders, too. It is very difficult—in fact close to impossible—for a nation to allow only the flows of payments that relate to goods and services, while clamping down or taxing other flows of financial capital. If a nation participates in international trade, it must also participate in international capital movements.

Finally, countries all over the world, especially low-income countries, are crying out for foreign investment to help develop their economies. Policies that discourage international financial investment may prevent some possible harm, but they rule out potentially substantial economic benefits as well.

A hard peg exchange rate policy will not allow short-term fluctuations in the exchange rate. If the government first announces a hard peg and then later changes its mind—perhaps the government becomes unwilling to keep interest rates high or to hold high levels of foreign exchange reserves—then the result of abandoning a hard peg could be a dramatic shift in the exchange rate.

In the mid-2000s, about one-third of the countries in the world used a soft peg approach and about one-quarter used a hard peg approach. The general trend in the 1990s was to shift away from a soft peg approach in favor of either floating rates or a hard peg. The concern is that a successful soft peg policy may, for a time, lead to very little variation in exchange rates, so that firms and banks in the economy begin to act as if a hard peg exists. When the exchange rate does move, the effects are especially painful because firms and banks have not planned and hedged against a possible change. Thus, the argument went, it is better either to be clear that the exchange rate is always flexible, or that it is fixed, but choosing an in-between soft peg option may end up being worst of all.

A Merged Currency

A final approach to exchange rate policy is for a nation to choose a common currency shared with one or more nations is also called a **merged currency**. A merged currency approach eliminates foreign exchange risk altogether. Just as no one worries about exchange rate movements when buying and selling between New York and California, Europeans know that the value of the euro will be the same in Germany and France and other

European nations that have adopted the euro.

However, a merged currency also poses problems. Like a hard peg, a merged currency means that a nation has given up altogether on domestic monetary policy, and instead has put its interest rate policies in other hands. When Ecuador uses the U.S. dollar as its currency, it has no voice in whether the Federal Reserve raises or lowers interest rates. The European Central Bank that determines monetary policy for the euro has representatives from all the euro nations. However, from the standpoint of, say, Portugal, there will be times when the decisions of the European Central Bank about monetary policy do not match the decisions that a Portuguese central bank would have made.

The lines between these four different exchange rate policies can blend into each other. For example, a soft peg exchange rate policy in which the government almost never acts to intervene in the exchange rate market will look a great deal like a floating exchange rate. Conversely, a soft peg policy in which the government intervenes often to keep the exchange rate near a specific level will look a lot like a hard peg. A decision to merge currencies with another country is, in effect, a decision to have a permanently fixed exchange rate with those countries, which is like a very hard exchange rate peg. Table 29.3 summarizes the range of exchange rates policy choices, with their advantages and disadvantages.

Situation	Floating Exchange Rates	Soft Peg	Hard Peg	Merged Currency
Large short-run fluctuations in exchange rates?	Often considerable in the short term	Maybe less in the short run, but still large changes over time	None, unless a change in the fixed rate	None
Large long-term fluctuations in exchange rates?	Can often happen	Can often happen	Cannot happen unless hard peg changes, in which case substantial volatility can occur	Cannot happen
Power of central bank to conduct countercyclical monetary policy?	Flexible exchange rates make monetary policy stronger	Some power, although conflicts may arise between exchange rate policy and countercyclical policy	Very little; central bank must keep exchange rate fixed	None; nation does not have its own currency
Costs of holding foreign exchange reserves?	Do not need to hold reserves	Hold moderate reserves that rise and fall over time	Hold large reserves	No need to hold reserves
Risk of ending up with an exchange rate that causes a large trade imbalance and very high inflows or outflows of financial capital?	Adjusts often	Adjusts over the medium term, if not the short term	May end up over time either far above or below the market level	Cannot adjust

TABLE 29.3 Tradeoffs of Exchange Rate Policies

Global macroeconomics would be easier if the whole world had one currency and one central bank. The exchange rates between different currencies complicate the picture. If financial markets solely set exchange rates, they fluctuate substantially as short-term portfolio investors try to anticipate tomorrow's news. If the government attempts to intervene in exchange rate markets through soft pegs or hard pegs, it gives up at least some of the power to use monetary policy to focus on domestic inflations and recessions, and it risks causing even greater fluctuations in foreign exchange markets.

There is no consensus among economists about which exchange rate policies are best: floating, soft peg, hard peg, or merged currencies. The choice depends both on how well a nation's central bank can implement a specific exchange rate policy and on how well a nation's firms and banks can adapt to different exchange rate policies. A national economy that does a fairly good job at achieving the four main economic goals of growth, low inflation, low unemployment, and a sustainable balance of trade will probably do just fine most of the time with any exchange rate policy. Conversely, no exchange rate policy is likely to save an economy that consistently fails at achieving these goals. Alternatively, a merged currency applied across wide geographic and cultural areas carries with it its own set of problems, such as the ability for countries to conduct their own independent monetary policies.

BRING IT HOME

Is a Stronger Dollar Good for the U.S. Economy?

The foreign exchange value of the dollar is a price and whether a higher price is good or bad depends on where you are standing: sellers benefit from higher prices and buyers are harmed. A stronger dollar is good for U.S. imports (and people working for U.S. importers) and U.S. investment abroad. It is also good for U.S. tourists going to other countries, since their dollar goes further. However, a stronger dollar is bad for U.S. exports (and people working in U.S. export industries); it is bad for foreign investment in the United States (leading, for example, to higher U.S. interest rates); and it is bad for foreign tourists (as well as U.S hotels, restaurants, and others in the tourist industry). In short, whether the U.S. dollar is good or bad is a more complex question than you may have thought. The economic answer is "it depends."

Key Terms

appreciating when a currency is worth more in terms of other currencies; also called “strengthening”
arbitrage the process of buying a good and selling goods across borders to take advantage of international price differences
depreciating when a currency is worth less in terms of other currencies; also called “weakening”
dollarize a country that is not the United States uses the U.S. dollar as its currency
floating exchange rate a country lets the exchange rate market determine its currency's value
foreign direct investment (FDI) purchasing more than ten percent of a firm or starting a new enterprise in another country
foreign exchange market the market in which people use one currency to buy another currency
hard peg an exchange rate policy in which the central bank sets a fixed and unchanging value for the exchange rate
hedge using a financial transaction as protection against risk
international capital flows flow of financial capital across national boundaries either as portfolio investment or direct investment
merged currency when a nation chooses to use another nation's currency
portfolio investment an investment in another country that is purely financial and does not involve any management responsibility
purchasing power parity (PPP) the exchange rate that equalizes the prices of internationally traded goods across countries
soft peg an exchange rate policy in which the government usually allows the market to set the exchange rate, but in some cases, especially if the exchange rate seems to be moving rapidly in one direction, the central bank will intervene
Tobin taxes see international capital flows

Key Concepts and Summary

29.1 How the Foreign Exchange Market Works

In the foreign exchange market, people and firms exchange one currency to purchase another currency. The demand for dollars comes from those U.S. export firms seeking to convert their earnings in foreign currency back into U.S. dollars; foreign tourists converting their earnings in a foreign currency back into U.S. dollars; and foreign investors seeking to make financial investments in the U.S. economy. On the supply side of the foreign exchange market for the trading of U.S. dollars are foreign firms that have sold imports in the U.S. economy and are seeking to convert their earnings back to their home currency; U.S. tourists abroad; and U.S. investors seeking to make financial investments in foreign economies. When currency A can buy more of currency B, then currency A has strengthened or appreciated relative to B. When currency A can buy less of currency B, then currency A has weakened or depreciated relative to B. If currency A strengthens or appreciates relative to currency B, then currency B must necessarily weaken or depreciate with regard to currency A. A stronger currency benefits those who are buying with that currency and injures those who are selling. A weaker currency injures those, like importers, who are buying with that currency and benefits those who are selling with it, like exporters.

29.2 Demand and Supply Shifts in Foreign Exchange Markets

In the extreme short run, ranging from a few minutes to a few weeks, speculators who are trying to invest in currencies that will grow stronger, and to sell currencies that will grow weaker influence exchange rates. Such speculation can create a self-fulfilling prophecy, at least for a time, where an expected appreciation leads to a stronger currency and vice versa. In the relatively short run, differences in rates of return influence exchange rate markets. Countries with relatively high real rates of return (for example, high interest rates) will tend to experience stronger currencies as they attract money from abroad, while countries with relatively low rates of return will tend to experience weaker exchange rates as investors convert to other currencies.

In the medium run of a few months or a few years, inflation rates influence exchange rate markets. Countries with relatively high inflation will tend to experience less demand for their currency than countries with lower inflation, and thus currency depreciation. Over long periods of many years, exchange rates tend to adjust toward the purchasing power parity (PPP) rate, which is the exchange rate such that the prices of internationally tradable goods in different countries, when converted at the PPP exchange rate to a common currency, are similar in all economies.

29.3 Macroeconomic Effects of Exchange Rates

A central bank will be concerned about the exchange rate for several reasons. Exchange rates will affect imports and exports, and thus affect aggregate demand in the economy. Fluctuations in exchange rates may cause difficulties for many firms, but especially banks. The exchange rate may accompany unsustainable flows of international financial capital.

29.4 Exchange Rate Policies

In a floating exchange rate policy, a government determines its country's exchange rate in the foreign exchange market. In a soft peg exchange rate policy, the foreign exchange market usually determines a country's exchange rate, but the government sometimes intervenes to strengthen or weaken it. In a hard peg exchange rate policy, the government chooses an exchange rate. A central bank can intervene in exchange markets in two ways. It can raise or lower interest rates to make the currency stronger or weaker. It also can directly purchase or sell its currency in foreign exchange markets. All exchange rates policies face tradeoffs. A hard peg exchange rate policy will reduce exchange rate fluctuations, but means that a country must focus its monetary policy on the exchange rate, not on fighting recession or controlling inflation. When a nation merges its currency with another nation, it gives up on nationally oriented monetary policy altogether.

A soft peg exchange rate may create additional volatility as exchange rate markets try to anticipate when and how the government will intervene. A flexible exchange rate policy allows monetary policy to focus on inflation and unemployment, and allows the exchange rate to change with inflation and rates of return, but also raises a risk that exchange rates may sometimes make large and abrupt movements. The spectrum of exchange rate policies includes: (a) a floating exchange rate, (b) a pegged exchange rate, soft or hard, and (c) a merged currency. Monetary policy can focus on a variety of goals: (a) inflation; (b) inflation or unemployment, depending on which is the most dangerous obstacle; and (c) a long-term rule based policy designed to keep the money supply stable and predictable.

Self-Check Questions

1. How will a stronger euro affect the following economic agents?
   a. A British exporter to Germany.
   b. A Dutch tourist visiting Chile.
   c. A Greek bank investing in a Canadian government bond.
   d. A French exporter to Germany.

2. Suppose that political unrest in Egypt leads financial markets to anticipate a depreciation in the Egyptian pound. How will that affect the demand for pounds, supply of pounds, and exchange rate for pounds compared to, say, U.S. dollars?

3. Suppose U.S. interest rates decline compared to the rest of the world. What would be the likely impact on the demand for dollars, supply of dollars, and exchange rate for dollars compared to, say, euros?

4. Suppose Argentina gets inflation under control and the Argentine inflation rate decreases substantially. What would likely happen to the demand for Argentine pesos, the supply of Argentine pesos, and the peso/U.S. dollar exchange rate?

5. This chapter has explained that "one of the most economically destructive effects of exchange rate fluctuations can happen through the banking system," if banks borrow from abroad to lend domestically. Why is this less likely to be a problem for the U.S. banking system?
6. A booming economy can attract financial capital inflows, which promote further growth. However, capital can just as easily flow out of the country, leading to economic recession. Is a country whose economy is booming because it decided to stimulate consumer spending more or less likely to experience capital flight than an economy whose boom is caused by economic investment expenditure?
7. How would a contractionary monetary policy affect the exchange rate, net exports, aggregate demand, and aggregate supply?
8. A central bank can allow its currency to fall indefinitely, but it cannot allow its currency to rise indefinitely. Why not?
9. Is a country for which imports and exports comprise a large fraction of the GDP more likely to adopt a flexible exchange rate or a fixed (hard peg) exchange rate?

Review Questions

10. What is the foreign exchange market?
11. Describe some buyers and some sellers in the market for U.S. dollars.
12. What is the difference between foreign direct investment and portfolio investment?
13. What does it mean to hedge a financial transaction?
14. What does it mean to say that a currency appreciates? Depreciates? Becomes stronger? Becomes weaker?
15. Does an expectation of a stronger exchange rate in the future affect the exchange rate in the present? If so, how?
16. Does a higher rate of return in a nation's economy, all other things being equal, affect the exchange rate of its currency? If so, how?
17. Does a higher inflation rate in an economy, other things being equal, affect the exchange rate of its currency? If so, how?
18. What is the purchasing power parity exchange rate?
19. What are some of the reasons a central bank is likely to care, at least to some extent, about the exchange rate?
20. How can an unexpected fall in exchange rates injure the financial health of a nation's banks?
21. What is the difference between a floating exchange rate, a soft peg, a hard peg, and dollarization?
22. List some advantages and disadvantages of the different exchange rate policies.

Critical Thinking Questions

23. Why would a nation "dollarize"—that is, adopt another country's currency instead of having its own?
24. Can you think of any major disadvantages to dollarization? How would a central bank work in a country that has dollarized?
25. If a country's currency is expected to appreciate in value, what would you think will be the impact of expected exchange rates on yields (e.g., the interest rate paid on government bonds) in that country? *Hint*: Think about how expected exchange rate changes and interest rates affect a currency's demand and supply.

26. Do you think that a country experiencing hyperinflation is more or less likely to have an exchange rate equal to its purchasing power parity value when compared to a country with a low inflation rate?

27. Suppose a country has an overall balance of trade so that exports of goods and services equal imports of goods and services. Does that imply that the country has balanced trade with *each* of its trading partners?

28. We learned that changes in exchange rates and the corresponding changes in the balance of trade amplify monetary policy. From the perspective of a nation's central bank, is this a good thing or a bad thing?

29. If a developing country needs foreign capital inflows, management expertise, and technology, how can it encourage foreign investors while at the same time protect itself against capital flight and banking system collapse, as happened during the Asian financial crisis?

30. Many developing countries, like Mexico, have moderate to high rates of inflation. At the same time, international trade plays an important role in their economies. What type of exchange rate regime would be best for such a country's currency *vis à vis* the U.S. dollar?

31. What would make a country decide to change from a common currency, like the euro, back to its own currency?

Problems

32. A British pound cost $2.00 in U.S. dollars in 2008, but $1.27 in U.S. dollars in 2017. Was the pound weaker or stronger against the dollar? Did the dollar appreciate or depreciate versus the pound?

Government Budgets and Fiscal Policy

30

FIGURE 30.1 Shut Downs and Parks Yellowstone National Park is one of the many national parks forced to close operations during the government shut down in 2013 and 2018–2019. (Credit: modification of "Close up of sign" by David Fulmer/Flickr Creative Commons, CC BY 2.0)

CHAPTER OBJECTIVES

In this chapter, you will learn about:

- Government Spending
- Taxation
- Federal Deficits and the National Debt
- Using Fiscal Policy to Fight Recessions, Unemployment, and Inflation
- Automatic Stabilizers
- Practical Problems with Discretionary Fiscal Policy
- The Question of a Balanced Budget

Introduction to Government Budgets and Fiscal Policy

BRING IT HOME

No Yellowstone Park?

You had trekked all the way to see Yellowstone National Park in the beautiful month of October 2013, only to find it... closed. Closed! Why?

For two weeks in October 2013, the U.S. federal government shut down. Many federal services, like the national parks, closed and 800,000 federal employees were furloughed. Tourists were shocked and so was the rest of the world: Congress and the President could not agree on a budget. Inside the Capitol, Republicans and Democrats

argued about spending priorities and whether to increase the national debt limit. Each year's budget, which is over $3 trillion of spending, must be approved by Congress and signed by the President. Two thirds of the budget are entitlements and other mandatory spending which occur without congressional or presidential action once the programs are established. Tied to the budget debate was the issue of increasing the debt ceiling—how high the U.S. government's national debt can be. The House of Representatives refused to sign on to the bills to fund the government unless they included provisions to stop or change the Affordable Health Care Act (more colloquially known as Obamacare). As the days progressed, the United States came very close to defaulting on its debt.

October 2013 was not the first time the government shut down, and it was not the last. Several brief shutdowns occurred in the early 1980s, and they occurred periodically in the following years. The longest shutdown took place between December 2018 and January 2019, when funding a border wall was a core disagreement.

Why does the federal budget create such intense debates? What would happen if the United States actually defaulted on its debt? In this chapter, we will examine the federal budget, taxation, and fiscal policy. We will also look at the annual federal budget deficits and the national debt.

All levels of government—federal, state, and local—have budgets that show how much revenue the government expects to receive in taxes and other income and how the government plans to spend it. Budgets, however, can shift dramatically within a few years, as policy decisions and unexpected events disrupt earlier tax and spending plans.

In this chapter, we revisit fiscal policy, which we first covered in Welcome to Economics! Fiscal policy is one of two policy tools for fine tuning the economy (the other is monetary policy). While policymakers at the Federal Reserve make monetary policy, Congress and the President make fiscal policy.

The discussion of fiscal policy focuses on how federal government taxing and spending affects aggregate demand. All government spending and taxes affect the economy, but fiscal policy focuses strictly on federal government policies. We begin with an overview of U.S. government spending and taxes. We then discuss fiscal policy from a short-run perspective; that is, how government uses tax and spending policies to address recession, unemployment, and inflation; how periods of recession and growth affect government budgets; and the merits of balanced budget proposals.

30.1 Government Spending

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Identify U.S. budget deficit and surplus trends over the past five decades
- Explain the differences between the U.S. federal budget, and state and local budgets

Government spending covers a range of services that the federal, state, and local governments provide. When the federal government spends more money than it receives in taxes in a given year, it runs a **budget deficit**. Conversely, when the government receives more money in taxes than it spends in a year, it runs a **budget surplus**. If government spending and taxes are equal, it has a **balanced budget**. For example, in 2020, the U.S. government experienced its largest budget deficit ever, as the federal government spent $3.1 trillion more than it collected in taxes. This deficit was about 15% of the size of the U.S. GDP in 2020, making it by far the largest budget deficit relative to GDP since the mammoth borrowing the government used to finance World War II. To put it into perspective, the previous record deficits were experienced during the Great Recession of 2007–2009, when the deficit reached 9.6% of GDP.

This section presents an overview of government spending in the United States.

Total U.S. Government Spending

Federal spending in nominal dollars (that is, dollars not adjusted for inflation) has grown by a multiple of more

than 38 over the last four decades, from $93.4 billion in 1960 to $6.8 trillion in 2020. Comparing spending over time in nominal dollars is misleading because it does not take into account inflation or growth in population and the real economy. A more useful method of comparison is to examine government spending as a percent of GDP over time.

The top line in Figure 30.2 shows the federal spending level since 1960, expressed as a share of GDP. Despite a widespread sense among many Americans that the federal government has been growing steadily larger, the graph shows that federal spending has hovered in a range from 18% to 22% of GDP most of the time since 1960. For example, throughout the latter part of the 2010s, government expenditures were around 20% of GDP. The other lines in Figure 30.2 show the major federal spending categories: national defense, Social Security, health programs, and interest payments. From the graph, we see that national defense spending as a share of GDP has generally declined since the 1960s, although there were some upward bumps in the 1980s buildup under President Ronald Reagan and in the aftermath of the terrorist attacks on September 11, 2001. In contrast, Social Security and healthcare have grown steadily as a percent of GDP. Healthcare expenditures include both payments for senior citizens (Medicare), and payments for low-income Americans (Medicaid). State governments also partially fund Medicaid. Interest payments are the final main category of government spending in Figure 30.2.

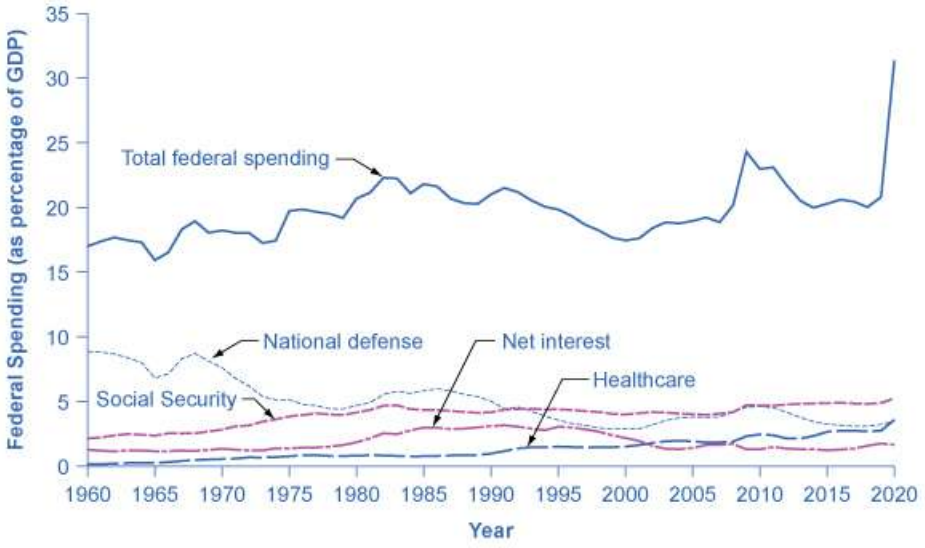


FIGURE 30.2 Federal Spending, 1960–2020 Since 1960, total federal spending has ranged from about 18% to 22% of GDP. It climbed above that level in 2009, quickly dropped back down to that level by 2013, and again climbed above that level in 2020. The share that the government has spent on national defense has generally declined, while the share it has spent on Social Security and on healthcare expenses (mainly Medicare and Medicaid) has increased. (Source: *Economic Report of the President*, 2021, Table B47, https://www.govinfo.gov/app/collection/erp/2021)

Each year, the government borrows funds from U.S. citizens and foreigners to cover its budget deficits. It does this by selling securities (Treasury bonds, notes, and bills)—in essence borrowing from the public and promising to repay with interest in the future. From 1961 to 1997, the U.S. government has run budget deficits, and thus borrowed funds, in almost every year. It had budget surpluses from 1998 to 2001, and then returned to deficits.

The interest payments on past federal government borrowing were typically 1–2% of GDP in the 1960s and 1970s but then climbed above 3% of GDP in the 1980s and stayed there until the late 1990s. The government was able to repay some of its past borrowing by running surpluses from 1998 to 2001 and, with help from low interest rates, the interest payments on past federal government borrowing had fallen back to 1.6% of GDP by 2020.

We investigate the government borrowing and debt patterns in more detail later in this chapter, but first we

need to clarify the difference between the deficit and the debt. *The deficit is not the debt.* The difference between the deficit and the debt lies in the time frame. The government deficit (or surplus) refers to what happens with the federal government budget each year. The government debt is accumulated over time. It is the sum of all past deficits and surpluses. If you borrow $10,000 per year for each of the four years of college, you might say that your annual deficit was $10,000, but your accumulated debt over the four years is $40,000.

These four categories—national defense, Social Security, healthcare, and interest payments—generally account for roughly 60% of all federal spending, as Figure 30.3 shows. (Due to the large amount of one-time expenditures by the federal government in 2020 due to the pandemic, the 2019 statistics are presented here.) The remaining 40% wedge of the pie chart covers all other categories of federal government spending: international affairs; science and technology; natural resources and the environment; transportation; housing; education; income support for people in poverty; community and regional development; law enforcement and the judicial system; and the administrative costs of running the government.

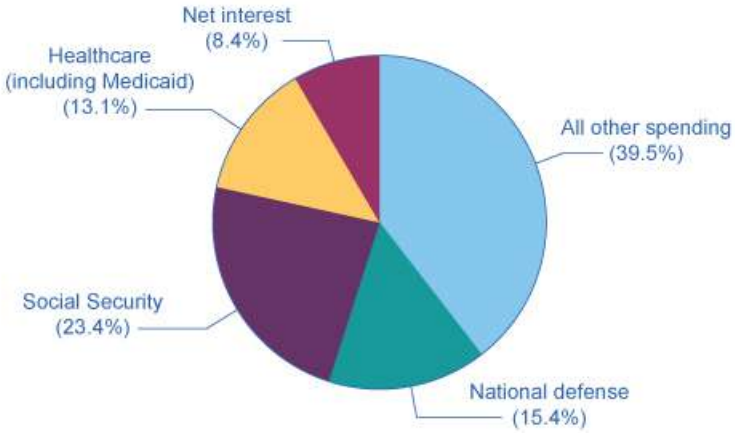


FIGURE 30.3 Slices of Federal Spending, 2019 About 60% of government spending goes to four major areas: national defense, Social Security, healthcare, and interest payments on past borrowing. This leaves about 40% of federal spending for all other functions of the U.S. government. (Source: https://www.whitehouse.gov/omb/budget/Historicals/)

State and Local Government Spending

Although federal government spending often gets most of the media attention, state and local government spending is also substantial—at about $3.3 trillion in 2021. Figure 30.4 shows that state and local government spending has increased during the last four decades from around 8% to around 14% today. The single biggest item is education, which accounts for about one-third of the total. The rest covers programs like highways, libraries, hospitals and healthcare, parks, and police and fire protection. Unlike the federal government, all states (except Vermont) have balanced budget laws, which means any gaps between revenues and spending must be closed by higher taxes, lower spending, drawing down their previous savings, or some combination of all of these.

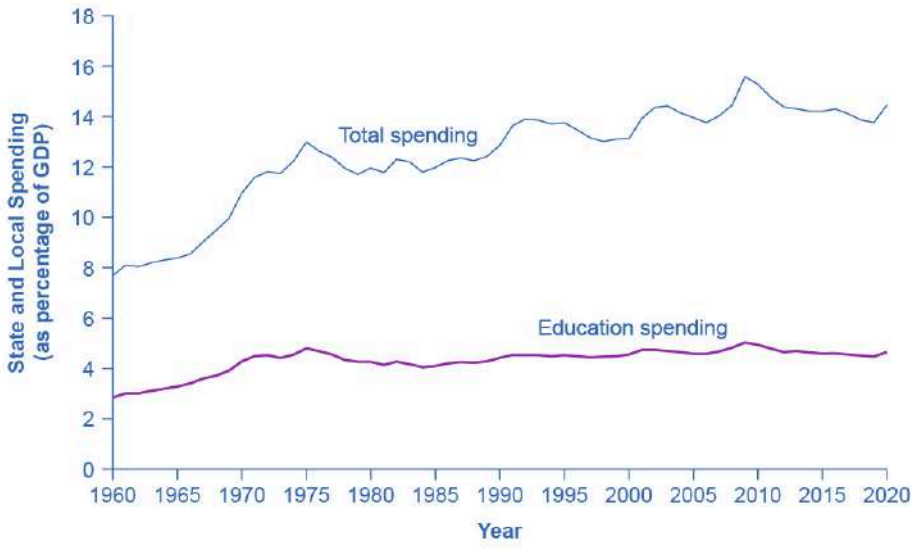


FIGURE 30.4 State and Local Spending, 1960–2020 Spending by state and local government increased from about 10% of GDP in the early 1960s to 14–16% by the mid-1970s. It has remained at roughly that level since. The single biggest spending item is education, including both K–12 spending and support for public colleges and universities, which has been about 4–5% of GDP in recent decades. Source: (Source: Bureau of Economic Analysis, https://apps.bea.gov/iTable/index_nipa.cfm.)

U.S. presidential candidates often run for office pledging to improve the public schools or to get tough on crime. However, in the U.S. government system, these tasks are primarily state and local government responsibilities. In fiscal year 2020 state and local governments spent about $970 billion per year on education (including K–12 and college and university education), compared to only $100 billion by the federal government. In other words, about 90 cents of every dollar spent on education happens at the state and local level. A politician who really wants hands-on responsibility for reforming education or reducing crime might do better to run for mayor of a large city or for state governor rather than for president of the United States.

Taxes are paid by most, but not all, people who work. Even if you are part of the so-called “1099” or “gig” economy, you are considered an independent contractor and must pay taxes on the income you earn in those occupations. Taxes are also paid by consumers whenever they purchase goods and services. Taxes are used for all sorts of spending—from roads, to bridges, to schools (K–12 and public higher education), to police and other public safety functions. Taxes fund vital public services that support our communities.

30.2 Taxation

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Differentiate among a regressive tax, a proportional tax, and a progressive tax
- Identify major revenue sources for the U.S. federal budget

There are two main categories of taxes: those that the federal government collects and those that the state and local governments collect. What percentage the government collects and for what it uses that revenue varies greatly. The following sections will briefly explain the taxation system in the United States.

Taxes are paid by most, but not all, people who work. Even if you are part of the so-called “1099” or “gig” economy, you are considered an independent contractor and must pay taxes on the income you earn in those occupations. Taxes are also paid by consumers whenever they purchase goods and services. Taxes are used for all sorts of spending—from roads, to bridges, to schools (K–12 and public higher education), to police and other public safety functions. Taxes fund vital public services that support our communities.

Federal Taxes

Just as many Americans erroneously think that federal spending has grown considerably, many also believe that taxes have increased substantially. The top line of Figure 30.5 shows total federal taxes as a share of GDP since 1960. Although the line rises and falls, it typically remains within the range of 17% to 20% of GDP, except for 2009–2011, when taxes fell substantially below this level, due to the Great Recession.

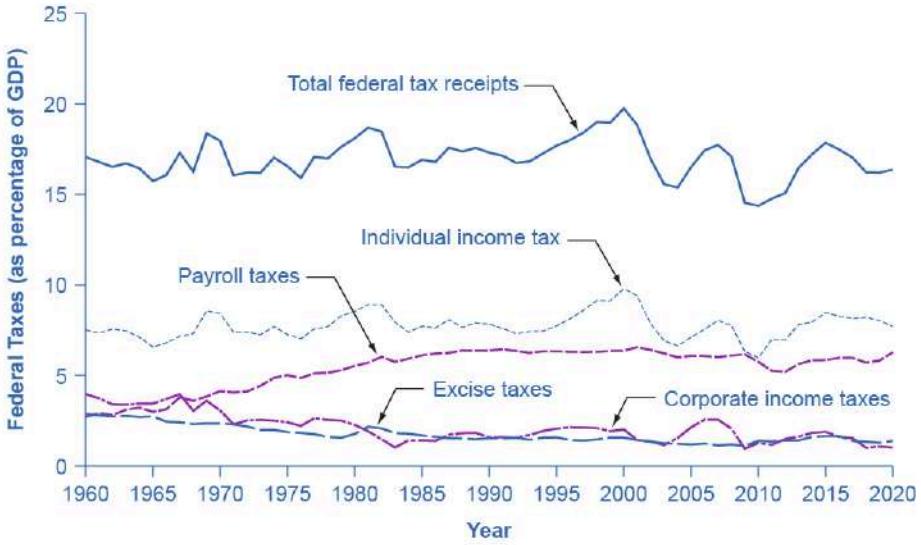


FIGURE 30.5 Federal Taxes, 1960–2020 Federal tax revenues have been about 17–20% of GDP during most periods in recent decades. The primary sources of federal taxes are individual income taxes and the payroll taxes that finance Social Security and Medicare. Corporate income taxes and social insurance taxes provide smaller shares of revenue. (Source: *Economic Report of the President, 2021*. Table B-47, https://www.govinfo.gov/app/collection/erp/2021)

Figure 30.5 also shows the taxation patterns for the main categories that the federal government taxes: individual income taxes, corporate income taxes, and social insurance and retirement receipts. When most people think of federal government taxes, the first tax that comes to mind is the **individual income tax** that is due every year on April 15 (or the first business day after). The personal income tax is the largest single source of federal government revenue, but it still represents less than half of federal tax revenue.

The second largest source of federal revenue is the **payroll tax** (captured in social insurance and retirement receipts), which provides funds for Social Security and Medicare. Payroll taxes have increased steadily over time. Together, the personal income tax and the payroll tax accounted for over 85% of federal tax revenues in 2020. Although personal income tax revenues account for more total revenue than the payroll tax, nearly three-quarters of households pay more in payroll taxes than in income taxes.

The income tax is a **progressive tax**, which means that the tax rates increase as a household's income increases. Taxes also vary with marital status, family size, and other factors. The **marginal tax rates** (the tax due on all yearly income) for a single taxpayer range from 10% to 35%, depending on income, as the following Clear It Up feature explains.

CLEAR IT UP

How does the marginal rate work?

Suppose that a single taxpayer's income is $35,000 per year. Also suppose that income from $0 to $9,075 is taxed at 10%, income from $9,075 to $36,900 is taxed at 15%, and, finally, income from $36,900 and beyond is taxed at 25%. Since this person earns $35,000, their marginal tax rate is 15%.

The key fact here is that the federal income tax is designed so that tax rates increase as income increases, up to a certain level. The payroll taxes that support Social Security and Medicare are designed in a different way. First, the payroll taxes for Social Security are imposed at a rate of 12.4% up to a certain wage limit, set at $137,700 in 2020. Medicare, on the other hand, pays for elderly healthcare, and is fixed at 2.9%, with no upper ceiling.

In both cases, the employer and the employee split the payroll taxes. An employee only sees 6.2% deducted from their paycheck for Social Security, and 1.45% from Medicare. However, as economists are quick to point out, the employer's half of the taxes are probably passed along to the employees in the form of lower wages, so in reality, the worker pays all of the payroll taxes. If you are a member of the "gig economy" and receive a 1099 tax statement, then you are considered an independent contractor and so you must pay the employee and employer side of the payroll tax.

We also call the Medicare payroll tax a **proportional tax**; that is, a flat percentage of all wages earned. The Social Security payroll tax is proportional up to the wage limit, but above that level it becomes a **regressive tax**, meaning that people with higher incomes pay a smaller share of their income in tax.

The third-largest source of federal tax revenue, as Figure 30.5 shows is the **corporate income tax**. The common name for corporate income is "profits." Over time, corporate income tax receipts have declined as a share of GDP, from about 4% in the 1960s to an average of 1% to 2% of GDP in the past 40 years.

The federal government has a few other, smaller sources of revenue. It imposes an **excise tax**—that is, a tax on a particular good—on gasoline, tobacco, and alcohol. As a share of GDP, the amount the government collects from these taxes has stayed nearly constant over time, from about 2% of GDP in the 1960s to roughly 3% by 2020, according to the nonpartisan Congressional Budget Office. The government also imposes an **estate and gift tax** on people who pass large amounts of assets to the next generation—either after death or during life in the form of gifts. These estate and gift taxes collected about 0.2% of GDP in 2020. By a quirk of legislation, the government repealed the estate and gift tax in 2010, but reinstated it in 2011. Other federal taxes, which are also relatively small in magnitude, include tariffs the government collects on imported goods and charges for inspections of goods entering the country.

State and Local Taxes

At the state and local level, taxes have been rising as a share of GDP over the last few decades to match the gradual rise in spending, as Figure 30.6 illustrates. The main revenue sources for state and local governments are sales taxes, property taxes, and revenue passed along from the federal government, but many state and local governments also levy personal and corporate income taxes, as well as impose a wide variety of fees and charges. The specific sources of tax revenue vary widely across state and local governments. Some states rely more on property taxes, some on sales taxes, some on income taxes, and some more on revenues from the federal government.

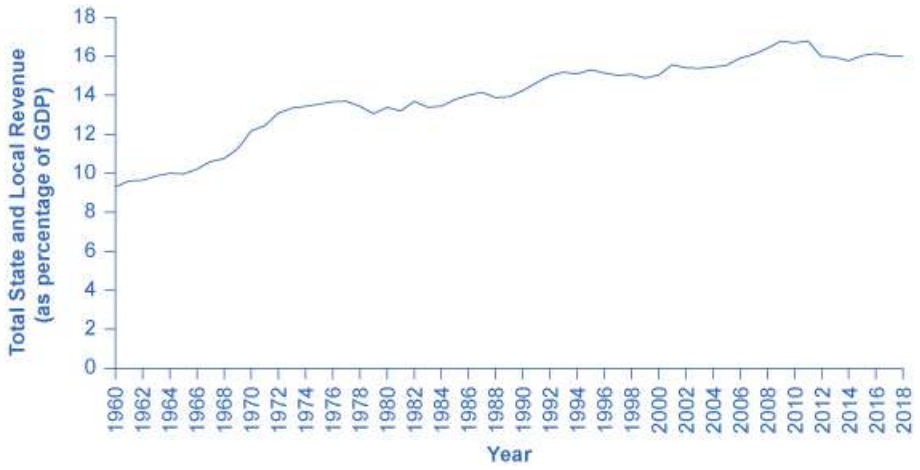


FIGURE 30.6 State and Local Tax Revenue as a Share of GDP, 1960–2020 State and local tax revenues have increased to match the rise in state and local spending. (Source: *Economic Report of the President, 2020.* Table B-50, https://www.govinfo.gov/app/collection/erp/2021)

30.3 Federal Deficits and the National Debt

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Explain the U.S. federal budget in terms of annual debt and accumulated debt
- Understand how economic growth or decline can influence a budget surplus or budget deficit

Having discussed the revenue (taxes) and expense (spending) side of the budget, we now turn to the annual budget deficit or surplus, which is the difference between the tax revenue collected and spending over a fiscal year, which starts October 1 and ends September 30 of the next year.

Figure 30.7 shows the pattern of annual federal budget deficits and surpluses, back to 1930, as a share of GDP. When the line is above the horizontal axis, the budget is in surplus. When the line is below the horizontal axis, a budget deficit occurred. Clearly, the biggest deficits as a share of GDP during this time were incurred to finance World War II. Deficits were also large during the 1930s, the 1980s, the early 1990s, 2007–2009 (the Great Recession), and 2020 (the pandemic-induced recession).

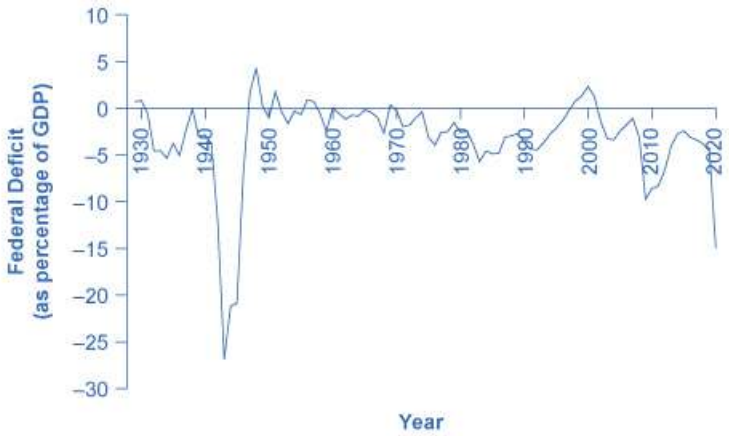


FIGURE 30.7 Pattern of Federal Budget Deficits and Surpluses, 1929–2020 The federal government has run budget deficits for decades. The budget was briefly in surplus in the late 1990s, before heading into deficit again in the first decade of the 2000s—and especially deep deficits in the 2007-2009 and 2020 recessions. (Source: Federal Reserve Bank of St. Louis (FRED). http://research.stlouisfed.org/fred2/series/FYFSGDA188S)

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the-national-debt)
Federal Surplus or Deficit as a Percentage of Gross Domestic Product

Debt/GDP Ratio

Another useful way to view the budget deficit is through the prism of accumulated debt rather than annual deficits. The **national debt** refers to the total amount that the government has borrowed over time. In contrast, the budget deficit refers to how much the government has borrowed in one particular year. Figure 30.8 shows the ratio of debt/GDP since 1966. Until the 1970s, the debt/GDP ratio revealed a fairly clear pattern of federal borrowing. The government ran up large deficits and raised the debt/GDP ratio in World War II, but from the 1950s to the 1970s the government ran either surpluses or relatively small deficits, and so the debt/GDP ratio drifted down. Large deficits in the 1980s and early 1990s caused the ratio to rise sharply. When budget surpluses arrived from 1998 to 2001, the debt/GDP ratio declined substantially. The budget deficits starting in 2002 then tugged the debt/GDP ratio higher—with a big jump when the recession took hold in 2008–2009. There was another leap in the ratio in 2020.

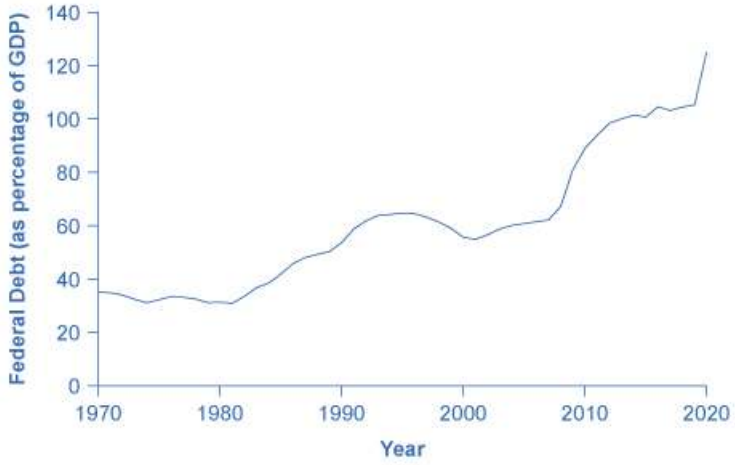

FIGURE 30.8 Federal Debt as a Percentage of GDP, 1942–2014 Federal debt is the sum of annual budget deficits and surpluses. Annual deficits do not always mean that the debt/GDP ratio is rising. During the 1960s and 1970s, the government often ran small deficits, but since the debt was growing more slowly than the economy, the debt/GDP ratio was declining over this time. In the 2008–2009 recession, the debt/GDP ratio rose sharply, before leveling off through the later 2010s. In 2020, it rose sharply again. (Source: https://fred.stlouisfed.org/series/GFDEGDQ188S)

The next Clear it Up feature discusses how the government handles the national debt.

CLEAR IT UP

What is the national debt?

One year's federal budget deficit causes the federal government to sell Treasury bonds to make up the difference between spending programs and tax revenues. The dollar value of all the outstanding Treasury bonds on which the federal government owes money is equal to the national debt.

Click to view content (https://openstax.org/books/principles-economics-3e/pages/30-3-federal-deficits-and-the-national-debt)
Gross Federal Debt as a Percentage of Gross Domestic Product

The Path from Deficits to Surpluses to Deficits

Why did the budget deficits suddenly turn to surpluses from 1998 to 2001 and why did the surpluses return to deficits in 2002? Why did the deficit become so large in 2020? Figure 30.9 suggests some answers. The graph combines the earlier information on total federal spending and taxes in a single graph, but focuses on the federal budget since 1990.

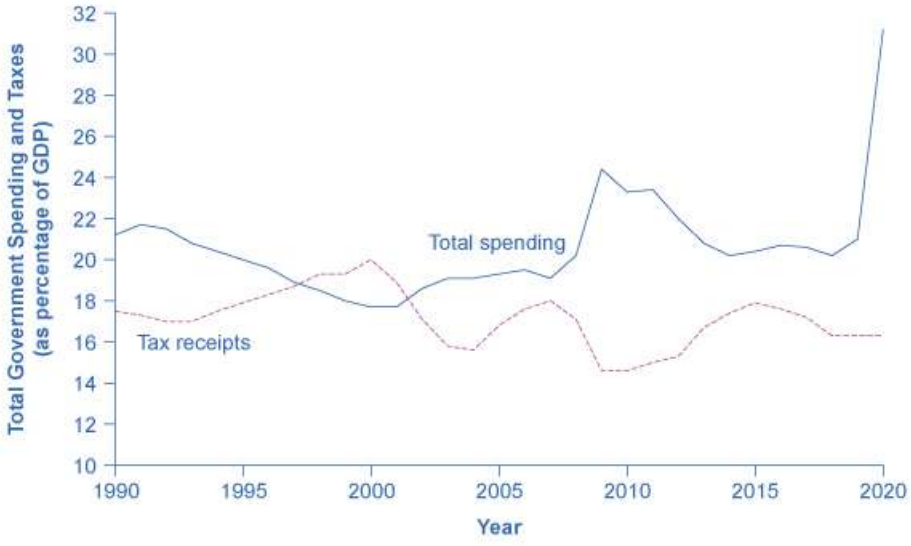

FIGURE 30.9 Total Government Spending and Taxes as a Share of GDP, 1990–2014 When government spending exceeds taxes, the gap is the budget deficit. When taxes exceed spending, the gap is a budget surplus. The recessionary period starting in late 2007 saw higher spending and lower taxes, combining to create a large deficit in 2009. The same thing happened in a more extreme way in 2020. (Source: *Economic Report of the President, Tables B-46*, https://www.govinfo.gov/app/collection/erp/2021)

Government spending as a share of GDP declined steadily through the 1990s. The biggest single reason was that defense spending declined from 5.2% of GDP in 1990 to 3.0% in 2000, but interest payments by the federal government also fell by about 1.0% of GDP. However, federal tax collections increased substantially in the later 1990s, jumping from 18.1% of GDP in 1994 to 20.8% in 2000. Powerful economic growth in the late 1990s fueled the boom in taxes. Personal income taxes rise as income goes up; payroll taxes rise as jobs and payrolls go up; corporate income taxes rise as profits go up. At the same time, government spending on transfer payments such as unemployment benefits, foods stamps, and welfare declined with more people working.

This sharp increase in tax revenues and decrease in expenditures on transfer payments was largely unexpected even by experienced budget analysts, and so budget surpluses came as a surprise. However, in the early 2000s, many of these factors started running in reverse. Tax revenues sagged, due largely to the recession that started in March 2001, which reduced revenues. Congress enacted a series of tax cuts and President George W. Bush signed them into law, starting in 2001. In addition, government spending swelled due to increases in defense, healthcare, education, Social Security, and support programs for those who were hurt by the recession and the slow growth that followed. Deficits returned. When the severe recession hit in late 2007, spending climbed and tax collections fell to historically unusual levels, resulting in enormous deficits.

Longer-term U.S. budget forecasts, a decade or more into the future, predict enormous deficits. The higher deficits during the 2007–2009 Great Recession and the 2020 pandemic-induced recession have repercussions, and the demographics will be challenging. The primary reason is the “baby boom”—the exceptionally high birthrates that began in 1946, right after World War II, and lasted for about two decades. Starting in 2010, the

front edge of the baby boom generation reached age 65, and in the next two decades, the proportion of Americans over the age of 65 will increase substantially. During the 2020 recession, we saw another wave of early retirements, and we are now in the middle of this major demographic shift. The current level of the payroll taxes that support Social Security and Medicare will fall well short of the projected expenses of these programs, as the following Clear It Up feature shows; thus, the forecast is for increasingly large budget deficits. A decision to collect more revenue to support these programs or to decrease benefit levels would alter this long-term forecast.

CLEAR IT UP

What is the long-term budget outlook for Social Security and Medicare?

In 1946, just one American in 13 was over age 65. By 2000, it was one in eight. By 2030, one American in five will be over age 65. Two enormous U.S. federal programs focus on the elderly—Social Security and Medicare. The growing numbers of elderly Americans will increase spending on these programs, as well as on Medicaid. The current payroll tax levied on workers, which supports all of Social Security and the hospitalization insurance part of Medicare, will not be enough to cover the expected costs, so what are the options?

Long-term projections from the Congressional Budget Office in 2021 are that Medicare and Social Security spending combined will rise from 8.7% of GDP in 2021 to about 10.8% by 2027–2031. If this rise in spending occurs, without any corresponding rise in tax collections, then some mix of changes must occur: (1) taxes will need to increase dramatically; (2) other spending will need to be cut dramatically; (3) the retirement age and/or age receiving Medicare benefits will need to increase, or (4) the federal government will need to run extremely large budget deficits.

Some proposals suggest removing the cap on wages subject to the payroll tax, so that those with very high incomes would have to pay the tax on the entire amount of their wages. Other proposals suggest moving Social Security and Medicare from systems in which workers pay for retirees toward programs that set up accounts where workers save funds over their lifetimes and then draw out after retirement to pay for healthcare.

The United States is not alone in this problem. Providing the promised level of retirement and health benefits to a growing proportion of elderly with a falling proportion of workers is an even more severe problem in many European nations and in Japan. How to pay promised levels of benefits to the elderly will be a difficult public policy decision.

In the next module we shift to the use of fiscal policy to counteract business cycle fluctuations. In addition, we will explore proposals requiring a balanced budget—that is, for government spending and taxes to be equal each year. The Impacts of Government Borrowing will also cover how fiscal policy and government borrowing will affect national saving—and thus affect economic growth and trade imbalances.

30.4 Using Fiscal Policy to Fight Recession, Unemployment, and Inflation

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Explain how expansionary fiscal policy can shift aggregate demand and influence the economy
- Explain how contractionary fiscal policy can shift aggregate demand and influence the economy

Fiscal policy is the use of government spending and tax policy to influence the path of the economy over time. Graphically, we see that fiscal policy, whether through changes in spending or taxes, shifts the aggregate demand outward in the case of **expansionary fiscal policy** and inward in the case of **contractionary fiscal policy**. We know from the chapter on economic growth that over time the quantity and quality of our resources grow as the population and thus the labor force get larger, as businesses invest in new capital, and as technology improves. The result of this is regular shifts to the right of the aggregate supply curves, as Figure 30.10 illustrates.

The original equilibrium occurs at E_0, the intersection of aggregate demand curve AD_0 and aggregate supply curve $SRAS_0$, at an output level of 200 and a price level of 90. One year later, aggregate supply has shifted to the right to $SRAS_1$ in the process of long-term economic growth, and aggregate demand has also shifted to the right to AD_1, keeping the economy operating at the new level of potential GDP. The new equilibrium (E_1) is an output level of 206 and a price level of 92. One more year later, aggregate supply has again shifted to the right, now to $SRAS_2$, and aggregate demand shifts right as well to AD_2. Now the equilibrium is E_2, with an output level of 212 and a price level of 94. In short, the figure shows an economy that is growing steadily year to year, producing at its potential GDP each year, with only small inflationary increases in the price level.

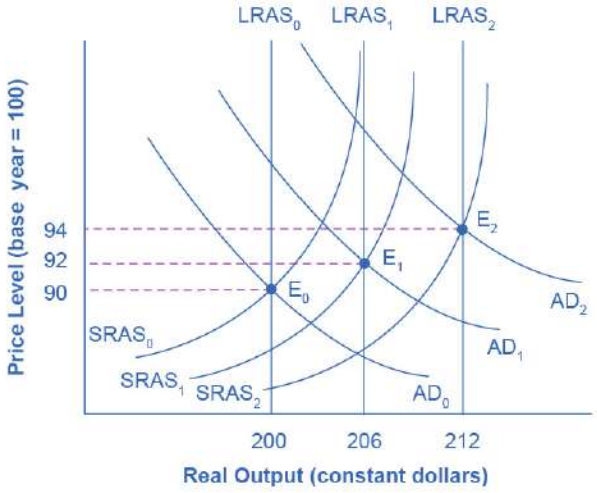

FIGURE 30.10 A Healthy, Growing Economy In this well-functioning economy, each year aggregate supply and aggregate demand shift to the right so that the economy proceeds from equilibrium E_0 to E_1 to E_2. Each year, the economy produces at potential GDP with only a small inflationary increase in the price level. However, if aggregate demand does not smoothly shift to the right and match increases in aggregate supply, growth with deflation can develop.

Aggregate demand and aggregate supply do not always move neatly together. Think about what causes shifts in aggregate demand over time. As aggregate supply increases, incomes tend to go up. This tends to increase consumer and investment spending, shifting the aggregate demand curve to the right, but in any given period it may not shift the same amount as aggregate supply. What happens to government spending and taxes? Government spends to pay for the ordinary business of government- items such as national defense, social security, and healthcare, as Figure 30.10 shows. Tax revenues, in part, pay for these expenditures. The result may be an increase in aggregate demand more than or less than the increase in aggregate supply. Aggregate demand may fail to increase along with aggregate supply, or aggregate demand may even shift left, for a number of possible reasons: households become hesitant about consuming; firms decide against investing as much; or perhaps the demand from other countries for exports diminishes.

For example, investment by private firms in physical capital in the U.S. economy boomed during the late 1990s, rising from 14.1% of GDP in 1993 to 17.2% in 2000, before falling back to 15.2% by 2002. Conversely, if shifts in aggregate demand run ahead of increases in aggregate supply, inflationary increases in the price level will result. Business cycles of recession and recovery are the consequence of shifts in aggregate supply and aggregate demand. As these occur, the government may choose to use fiscal policy to address the difference.

Monetary Policy and Bank Regulation shows us that a central bank can use its powers over the banking system to engage in countercyclical—or "against the business cycle"—actions. If recession threatens, the central bank uses an expansionary monetary policy to increase the money supply, increase the quantity of loans, reduce interest rates, and shift aggregate demand to the right. If inflation threatens, the central bank uses contractionary monetary policy to reduce the money supply, reduce the quantity of loans, raise interest rates,

and shift aggregate demand to the left. Fiscal policy is another macroeconomic policy tool for adjusting aggregate demand by using either government spending or taxation policy.

Expansionary Fiscal Policy

Expansionary fiscal policy increases the level of aggregate demand, through either increases in government spending or reductions in tax rates. Expansionary policy can do this by (1) increasing consumption by raising disposable income through cuts in personal income taxes or payroll taxes; (2) increasing investment spending by raising after-tax profits through cuts in business taxes; and (3) increasing government purchases through increased federal government spending on final goods and services and raising federal grants to state and local governments to increase their expenditures on final goods and services. Contractionary fiscal policy does the reverse: it decreases the level of aggregate demand by decreasing consumption, decreasing investment, and decreasing government spending, either through cuts in government spending or increases in taxes. The aggregate demand/aggregate supply model is useful in judging whether expansionary or contractionary fiscal policy is appropriate.

Consider first the situation in Figure 30.11, which is similar to the U.S. economy during the 2007-2009 recession. The intersection of aggregate demand (AD_0) and aggregate supply ($SRAS_0$) is occurring below the level of potential GDP as the LRAS curve indicates. At the equilibrium (E_0), a recession occurs and unemployment rises. In this case, expansionary fiscal policy using tax cuts or increases in government spending can shift aggregate demand to AD_1, closer to the full-employment level of output. In addition, the price level would rise back to the level P_1 associated with potential GDP.

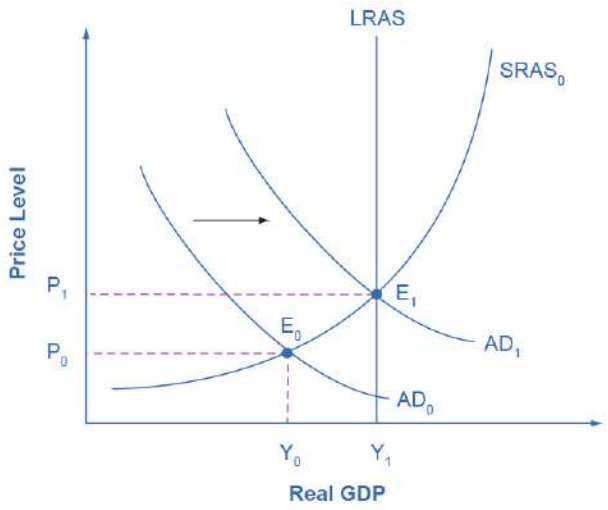

FIGURE 30.11 Expansionary Fiscal Policy The original equilibrium (E_0) represents a recession, occurring at a quantity of output (Y_0) below potential GDP. However, a shift of aggregate demand from AD_0 to AD_1, enacted through an expansionary fiscal policy, can move the economy to a new equilibrium output of E_1 at the level of potential GDP which the LRAS curve shows. Since the economy was originally producing below potential GDP, any inflationary increase in the price level from P_0 to P_1 that results should be relatively small.

Should the government use tax cuts or spending increases, or a mix of the two, to carry out expansionary fiscal policy? During the 2007-2009 Great Recession, the U.S. economy suffered a 3.1% cumulative loss of GDP. That may not sound like much, but it's more than one year's average growth rate of GDP. Over that time frame, the unemployment rate doubled from 5% to 10%. The choice between whether to use tax or spending tools often has a political tinge. As a general statement, conservatives and Republicans prefer to see expansionary fiscal policy carried out by tax cuts, while liberals and Democrats prefer that the government implement expansionary fiscal policy through spending increases. In a bipartisan effort to address the extreme situation, the Obama administration and Congress passed an $830 billion expansionary policy in early 2009 involving both tax cuts and increases in government spending. At the same time, however, the federal stimulus was

partially offset when state and local governments, whose budgets were hard hit by the recession, began cutting their spending.

Events were even more severe during the more recent pandemic-induced recession. In a single quarter (Quarter 2 of 2020), GDP fell by over 9%, or at an annualized rate of about 34%. Policymakers were quick to respond with expanded unemployment insurance, aid to state and local governments (so that they didn't have to cut their spending like they did during the Great Recession), grants and tax breaks for small businesses, and perhaps most significantly, stimulus checks sent to over 100 million households, totaling thousands of dollars each. Since these were mostly spending measures, they were supported more by Democrats than by Republicans, although both groups recognized the severity of the problem and were largely in agreement early on. Especially during the debates over later rounds of the stimulus checks, many discussions were had over the appropriate size and target of the checks. Ultimately, compromises were made and no side got exactly what it wanted.

The conflict over which policy tool to use can be frustrating to those who want to categorize economics as "liberal" or "conservative," or who want to use economic models to argue against their political opponents. However, advocates of smaller government, who seek to reduce taxes and government spending can use the AD AS model, as well as advocates of bigger government, who seek to raise taxes and government spending. Economic studies of specific taxing and spending programs can help inform decisions about whether the government should change taxes or spending, and in what ways. Ultimately, decisions about whether to use tax or spending mechanisms to implement macroeconomic policy is a political decision rather than a purely economic one.

Contractionary Fiscal Policy

Fiscal policy can also contribute to pushing aggregate demand beyond potential GDP in a way that leads to inflation. As Figure 30.12 shows, a very large budget deficit pushes up aggregate demand, so that the intersection of aggregate demand (AD_0) and aggregate supply ($SRAS_0$) occurs at equilibrium E_0, which is an output level above potential GDP. Economists sometimes call this an "overheating economy" where demand is so high that there is upward pressure on wages and prices, causing inflation. In this situation, contractionary fiscal policy involving federal spending cuts or tax increases can help to reduce the upward pressure on the price level by shifting aggregate demand to the left, to AD_1, and causing the new equilibrium E_1 to be at potential GDP, where aggregate demand intersects the LRAS curve.

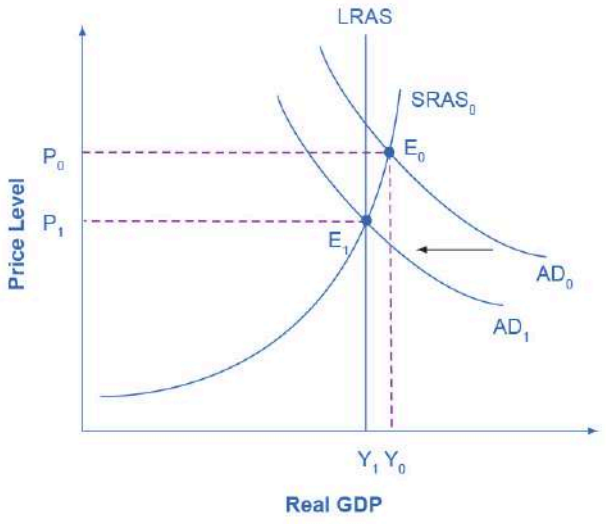

FIGURE 30.12 A Contractionary Fiscal Policy The economy starts at the equilibrium quantity of output Y_0, which is above potential GDP. The extremely high level of aggregate demand will generate inflationary increases in the price level. A contractionary fiscal policy can shift aggregate demand down from AD_0 to AD_1, leading to a new equilibrium

output E_1, which occurs at potential GDP, where AD1 intersects the LRAS curve.

Again, the AD–AS model does not dictate how the government should carry out this contractionary fiscal policy. Some may prefer spending cuts; others may prefer tax increases; still others may say that it depends on the specific situation. The model only argues that, in this situation, the government needs to reduce aggregate demand.

30.5 Automatic Stabilizers

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Describe how the federal government can use discretionary fiscal policy to stabilize the economy
- Identify examples of automatic stabilizers
- Understand how a government can use standardized employment budget to identify automatic stabilizers

In 2020, more than 20 million people could collect unemployment insurance benefits to replace some of their salaries. Federal fiscal policies include **discretionary fiscal policy**, when the government passes a new law that explicitly changes tax or spending levels. The 2020 stimulus checks and increases in state and local government aid are an example. Changes in tax and spending levels can also occur automatically, due to **automatic stabilizers**, such as unemployment insurance and food stamps, which are programs that are already laws that stimulate aggregate demand in a recession and hold down aggregate demand in a potentially inflationary boom.

Counterbalancing Recession and Boom

Consider first the situation where aggregate demand has risen sharply, causing the equilibrium to occur at a level of output above potential GDP. This situation will increase inflationary pressure in the economy. The policy prescription in this setting would be a dose of contractionary fiscal policy, implemented through some combination of higher taxes and lower spending. To some extent, *both* changes happen automatically. On the tax side, a rise in aggregate demand means that workers and firms throughout the economy earn more. Because taxes are based on personal income and corporate profits, a rise in aggregate demand automatically increases tax payments. On the spending side, stronger aggregate demand typically means lower unemployment and fewer layoffs, and so there is less need for government spending on unemployment benefits, welfare, Medicaid, and other programs in the social safety net.

The process works in reverse, too. If aggregate demand were to fall sharply so that a recession occurs, then the prescription would be for expansionary fiscal policy—some mix of tax cuts and spending increases. The lower level of aggregate demand and higher unemployment will tend to pull down personal incomes and corporate profits, an effect that will reduce the amount of taxes owed automatically. Higher unemployment and a weaker economy should lead to increased government spending on unemployment benefits, welfare, and other similar domestic programs. In 2009, the stimulus package included an extension in the time allowed to collect unemployment insurance. In addition, the automatic stabilizers react to a weakening of aggregate demand with expansionary fiscal policy and react to a strengthening of aggregate demand with contractionary fiscal policy, just as the AD/AS analysis suggests.

A combination of automatic stabilizers and discretionary fiscal policy produced the very large budget deficit in 2020. The pandemic caused high levels of unemployment, meaning less tax-generating economic activity. The high unemployment rate triggered the automatic stabilizers that reduce taxes and increase spending, due to the increased amount of unemployment insurance paid out by the federal and state governments. Most economists, even those who are concerned about a possible pattern of persistently large budget deficits, are much less concerned or even quite supportive of larger budget deficits in the short run of a few years during and immediately after a severe recession.

A glance back at economic history provides a second illustration of the power of automatic stabilizers.

Remember that the length of economic upswings between recessions has become longer in the U.S. economy in recent decades (as we discussed in Unemployment). The three longest economic booms of the twentieth century happened in the 1960s, the 1980s, and the 1991–2001 time period. One reason why the economy has tipped into recession less frequently in recent decades is that the size of government spending and taxes has increased in the second half of the twentieth century. Thus, the automatic stabilizing effects from spending and taxes are now larger than they were in the first half of the twentieth century. Around 1900, for example, federal spending was only about 2% of GDP. In 1929, just before the Great Depression hit, government spending was still just 4% of GDP. In those earlier times, the smaller size of government made automatic stabilizers far less powerful than in the last few decades, when government spending often hovers at 20% of GDP or more.

The Standardized Employment Deficit or Surplus

Each year, the nonpartisan Congressional Budget Office (CBO) calculates the **standardized employment budget**—that is, what the budget deficit or surplus would be if the economy were producing at potential GDP, where people who look for work were finding jobs in a reasonable period of time and businesses were making normal profits, with the result that both workers and businesses would be earning more and paying more taxes. In effect, the standardized employment deficit eliminates the impact of the automatic stabilizers. Figure 30.13 compares the actual budget deficits of recent decades with the CBO's standardized deficit.

LINK IT UP

Visit this website (http://openstax.org/l/CBO) to learn more from the Congressional Budget Office.

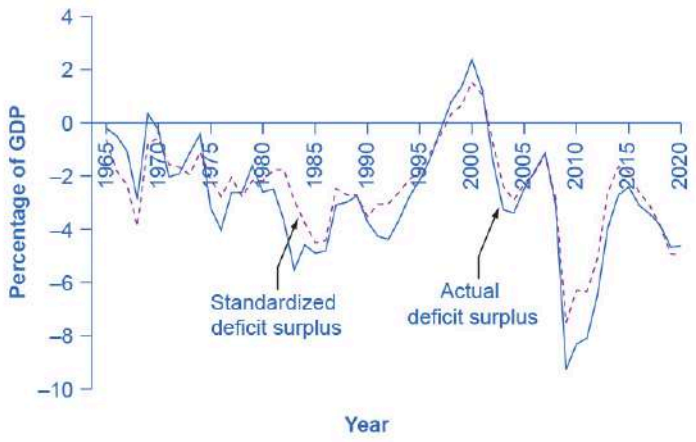

FIGURE 30.13 Comparison of Actual Budget Deficits with the Standardized Employment Deficit When the economy is in recession, the standardized employment budget deficit is less than the actual budget deficit because the economy is below potential GDP, and the automatic stabilizers are reducing taxes and increasing spending. When the economy is performing extremely well, the standardized employment deficit (or surplus) is higher than the actual budget deficit (or surplus) because the economy is producing about potential GDP, so the automatic stabilizers are increasing taxes and reducing the need for government spending. (Sources: *Actual and Cyclically Adjusted Budget Surpluses/Deficits,* https://www.cbo.gov/data/budget-economic-data#8)

Notice that in recession years, like the early 1990s, 2001, or 2009, the standardized employment deficit is smaller than the actual deficit. (These data are only available up until February 2020, so they do not include the effects of the pandemic.) During recessions, the automatic stabilizers tend to increase the budget deficit, so if the economy was instead at full employment, the deficit would be reduced. However, in the late 1990s the standardized employment budget surplus was lower than the actual budget surplus. The gap between the standardized budget deficit or surplus and the actual budget deficit or surplus shows the impact of the automatic stabilizers. More generally, the standardized budget figures allow you to see what the budget deficit

would look like with the economy held constant—at its potential GDP level of output.

Automatic stabilizers occur quickly. Lower wages means that a lower amount of taxes is withheld from paychecks right away. Higher unemployment or poverty means that government spending in those areas rises as quickly as people apply for benefits. However, while the automatic stabilizers offset part of the shifts in aggregate demand, they do not offset all or even most of it. Historically, automatic stabilizers on the tax and spending side offset about 10% of any initial movement in the level of output. This offset may not seem enormous, but it is still useful. Automatic stabilizers, like shock absorbers in a car, can be useful if they reduce the impact of the worst bumps, even if they do not eliminate the bumps altogether.

Child Tax Credit

One new form of government spending meant to support working families is an expanded Child Tax Credit (CTC). Under changes which took effect in 2021, qualifying families will receive the credit as a monthly payment directly into their bank accounts. The credit is also an expanded amount: from $2,000 per child to $3,600 per child under the age of 6 (less for children older than that). Introduced by President Joe Biden's American Rescue Plan, it is hoped that the newly expanded CTC will help reduce child poverty and support families. Because the CTC works like a grant that is automatically extended to households, the CTC is considered a new kind of fiscal policy that is related to a universal basic income policy which some have argued for in the past. By sending money out monthly instead of a lump sum as part of a person's tax refund, the intention is to help families better manage monthly bills for things like clothes and food.

30.6 Practical Problems with Discretionary Fiscal Policy

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Understand how fiscal policy and monetary policy are interconnected
- Explain the three lag times that often occur when solving economic problems
- Identify the legal and political challenges of responding to an economic problem

In the early 1960s, many leading economists believed that the problem of the business cycle, and the swings between cyclical unemployment and inflation, were a thing of the past. On the cover of its December 31, 1965, issue, *Time* magazine, then the premier news magazine in the United States, ran a picture of John Maynard Keynes, and the story inside identified Keynesian theories as "the prime influence on the world's economies." The article reported that policymakers have "used Keynesian principles not only to avoid the violent [business] cycles of prewar days but to produce phenomenal economic growth and to achieve remarkably stable prices."

This happy consensus, however, did not last. The U.S. economy suffered one recession from December 1969 to November 1970, a deeper recession from November 1973 to March 1975, and then double-dip recessions from January to June 1980 and from July 1981 to November 1982. At various times, inflation and unemployment both soared. Clearly, the problems of macroeconomic policy had not been completely solved. As economists began to consider what had gone wrong, they identified a number of issues that make discretionary fiscal policy more difficult than it had seemed in the rosy optimism of the mid-1960s.

Fiscal Policy and Interest Rates

Because fiscal policy affects the quantity that the government borrows in financial capital markets, it not only affects aggregate demand—it can also affect interest rates. In Figure 30.14, the original equilibrium (E_0) in the financial capital market occurs at a quantity of $800 billion and an interest rate of 6%. However, an increase in government budget deficits shifts the demand for financial capital from D_0 to D_1. The new equilibrium (E_1) occurs at a quantity of $900 billion and an interest rate of 7%.

A consensus estimate based on a number of studies is that an increase in budget deficits (or a fall in budget surplus) by 1% of GDP will cause an increase of 0.5–1.0% in the long-term interest rate.

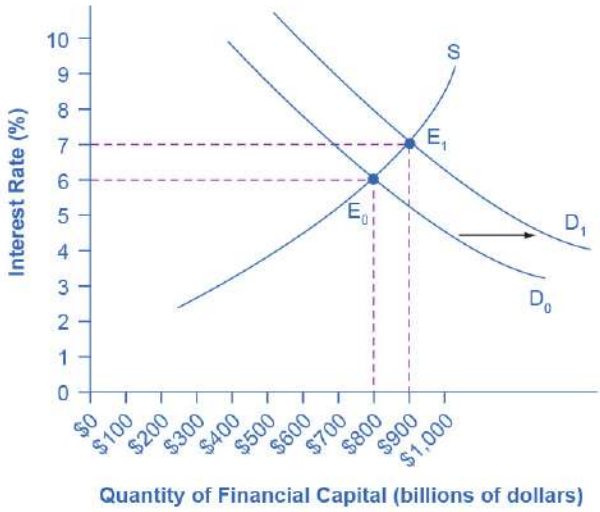

FIGURE 30.14 Fiscal Policy and Interest Rates When a government borrows money in the financial capital market, it causes a shift in the demand for financial capital from D_0 to D_1. As the equilibrium moves from E_0 to E_1, the equilibrium interest rate rises from 6% to 7% in this example. In this way, an expansionary fiscal policy intended to shift aggregate demand to the right can also lead to a higher interest rate, which has the effect of shifting aggregate demand back to the left.

A problem arises here. An expansionary fiscal policy, with tax cuts or spending increases, is intended to increase aggregate demand. If an expansionary fiscal policy also causes higher interest rates, then firms and households are discouraged from borrowing and spending (as occurs with tight monetary policy), thus reducing aggregate demand. Even if the direct effect of expansionary fiscal policy on increasing demand is not totally offset by lower aggregate demand from higher interest rates, fiscal policy can end up less powerful than was originally expected. We refer to this as **crowding out**, where government borrowing and spending results in higher interest rates, which reduces business investment and household consumption.

The broader lesson is that the government must coordinate fiscal and monetary policy. If expansionary fiscal policy is to work well, then the central bank can also reduce or keep short-term interest rates low. Conversely, monetary policy can also help to ensure that contractionary fiscal policy does not lead to a recession.

Long and Variable Time Lags

The government can change monetary policy several times each year, but it takes much longer to enact fiscal policy. Imagine that the economy starts to slow down. It often takes some months before the economic statistics signal clearly that a downturn has started, and a few months more to confirm that it is truly a recession and not just a one- or two-month blip. Economists often call the time it takes to determine that a recession has occurred the **recognition lag**. After this lag, policymakers become aware of the problem and propose fiscal policy bills. The bills go into various congressional committees for hearings, negotiations, votes, and then, if passed, eventually for the president's signature. Many fiscal policy bills about spending or taxes propose changes that would start in the next budget year or would be phased in gradually over time. Economists often refer to the time it takes to pass a bill as the **legislative lag**. Finally, once the government passes the bill it takes some time to disperse the funds to the appropriate agencies to implement the programs. Economists call the time it takes to start the projects the **implementation lag**.

Moreover, the exact level of fiscal policy that the government should implement is never completely clear. Should it increase the budget deficit by 0.5% of GDP? By 1% of GDP? By 2% of GDP? In an AD/AS diagram, it is straightforward to sketch an aggregate demand curve shifting to the potential GDP level of output. In the real world, we only know roughly, not precisely, the actual level of potential output, and exactly how a spending cut or tax increase will affect aggregate demand is always somewhat controversial. Also unknown is the state of the

economy at any point in time. During the early days of the Obama administration, for example, no one knew the true extent of the economy's deficit. During the 2008-2009 financial crisis, the rapid collapse of the banking system and automotive sector made it difficult to assess how quickly the economy was collapsing.

Thus, it can take many months or even more than a year to begin an expansionary fiscal policy after a recession has started—and even then, uncertainty will remain over exactly how much to expand or contract taxes and spending. When politicians attempt to use countercyclical fiscal policy to fight recession or inflation, they run the risk of responding to the macroeconomic situation of two or three years ago, in a way that may be exactly wrong for the economy at that time. George P. Schultz, a professor of economics, former Secretary of the Treasury, and Director of the Office of Management and Budget, once wrote: "While the economist is accustomed to the concept of lags, the politician likes instant results. The tension comes because, as I have seen on many occasions, the economist's lag is the politician's nightmare."

Temporary and Permanent Fiscal Policy

A temporary tax cut or spending increase will explicitly last only for a year or two, and then revert to its original level. A permanent tax cut or spending increase is expected to stay in place for the foreseeable future. The effect of temporary and permanent fiscal policies on aggregate demand can be very different. Consider how you would react if the government announced a tax cut that would last one year and then be repealed, in comparison with how you would react if the government announced a permanent tax cut. Most people and firms will react more strongly to a permanent policy change than a temporary one.

This fact creates an unavoidable difficulty for countercyclical fiscal policy. The appropriate policy may be to have an expansionary fiscal policy with large budget deficits during a recession, and then a contractionary fiscal policy with budget surpluses when the economy is growing well. However, if both policies are explicitly temporary ones, they will have a less powerful effect than a permanent policy.

Structural Economic Change Takes Time

When an economy recovers from a recession, it does not usually revert to its exact earlier shape. Instead, the economy's internal structure evolves and changes and this process can take time. For example, much of the economic growth of the mid-2000s was in the construction sector (especially of housing) and finance. However, when housing prices started falling in 2007 and the resulting financial crunch led into recession (as we discussed in Monetary Policy and Bank Regulation), both sectors contracted. The manufacturing sector of the U.S. economy has been losing jobs in recent years as well, under pressure from technological change and foreign competition. Many of the people who lost work from these sectors in the 2008-2009 Great Recession will never return to the same jobs in the same sectors of the economy. Instead, the economy will need to grow in new and different directions, as the following Clear It Up feature shows. Fiscal policy can increase overall demand, but the process of structural economic change—the expansion of a new set of industries and the movement of workers to those industries—inevitably takes time.

CLEAR IT UP

Why do jobs vanish?

People can lose jobs for a variety of reasons: because of a recession, but also because of longer-run changes in the economy, such as new technology. Productivity improvements in auto manufacturing, for example, can reduce the number of workers needed, and eliminate these jobs in the long run. The internet has created jobs but also caused job loss, from travel agents to book store clerks. Many of these jobs may never come back. Short-run fiscal policy to reduce unemployment can create jobs, but it cannot replace jobs that will never return.

The Limitations of Fiscal Policy

Fiscal policy can help an economy that is producing below its potential GDP to expand aggregate demand so

that it produces closer to potential GDP, thus lowering unemployment. However, fiscal policy cannot help an economy produce at an output level above potential GDP without causing inflation At this point, unemployment becomes so low that workers become scarce and wages rise rapidly.

LINK IT UP

Visit this website (http://openstax.org/l/fiscalpolicy) to read about how fiscal policies are affecting the recovery.

Political Realties and Discretionary Fiscal Policy

A final problem for discretionary fiscal policy arises out of the difficulties of explaining to politicians how countercyclical fiscal policy that runs against the tide of the business cycle should work. Some politicians have a gut-level belief that when the economy and tax revenues slow down, it is time to hunker down, pinch pennies, and trim expenses. Countercyclical policy, however, says that when the economy has slowed, it is time for the government to stimulate the economy, raising spending, and cutting taxes. This offsets the drop in the economy in the other sectors. Conversely, when economic times are good and tax revenues are rolling in, politicians often feel that it is time for tax cuts and new spending. However, countercyclical policy says that this economic boom should be an appropriate time for keeping taxes high and restraining spending.

Politicians tend to prefer expansionary fiscal policy over contractionary policy. There is rarely a shortage of proposals for tax cuts and spending increases, especially during recessions. However, politicians are less willing to hear the message that in good economic times, they should propose tax increases and spending limits. In the economic upswing of the late 1990s and early 2000s, for example, the U.S. GDP grew rapidly. Estimates from respected government economic forecasters like the nonpartisan Congressional Budget Office and the Office of Management and Budget stated that the GDP was above potential GDP, and that unemployment rates were unsustainably low. However, no mainstream politician took the lead in saying that the booming economic times might be an appropriate time for spending cuts or tax increases.

Discretionary Fiscal Policy: Summing Up

Expansionary fiscal policy can help to end recessions and contractionary fiscal policy can help to reduce inflation. Given the uncertainties over interest rate effects, time lags, temporary and permanent policies, and unpredictable political behavior, many economists and knowledgeable policymakers had concluded by the mid-1990s that discretionary fiscal policy was a blunt instrument, more like a club than a scalpel. It might still make sense to use it in extreme economic situations, like an especially deep or long recession. For less extreme situations, it was often preferable to let fiscal policy work through the automatic stabilizers and focus on monetary policy to steer short-term countercyclical efforts.

30.7 The Question of a Balanced Budget

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Understand the arguments for and against requiring the U.S. federal budget to be balanced
- Consider the long-run and short-run effects of a federal budget deficit

For many decades, going back to the 1930s, various legislators have put forward proposals to require that the U.S. government balance its budget every year. In 1995, a proposed constitutional amendment that would require a balanced budget passed the U.S. House of Representatives by a wide margin, and failed in the U.S. Senate by only a single vote. (For the balanced budget to have become an amendment to the Constitution would have required a two-thirds vote by Congress and passage by three-quarters of the state legislatures.)

Most economists view the proposals for a perpetually balanced budget with bemusement. After all, in the short term, economists would expect the budget deficits and surpluses to fluctuate up and down with the economy and the automatic stabilizers. Economic recessions should automatically lead to larger budget deficits or

smaller budget surpluses, while economic booms lead to smaller deficits or larger surpluses. A requirement that the budget be balanced each and every year would prevent these automatic stabilizers from working and would worsen the severity of economic fluctuations.

Some supporters of the balanced budget amendment like to argue that, since households must balance their own budgets, the government should too. However, this analogy between household and government behavior is severely flawed. Most households do not balance their budgets every year. Some years households borrow to buy houses or cars or to pay for medical expenses or college tuition. Other years they repay loans and save funds in retirement accounts. After retirement, they withdraw and spend those savings. Also, the government is not a household for many reasons, one of which is that the government has macroeconomic responsibilities. The argument of Keynesian macroeconomic policy is that the government needs to lean against the wind, spending when times are hard and saving when times are good, for the sake of the overall economy.

There is also no particular reason to expect a government budget to be balanced in the medium term of a few years. For example, a government may decide that by running large budget deficits, it can make crucial long-term investments in human capital and physical infrastructure that will build the country's long-term productivity. These decisions may work out well or poorly, but they are not always irrational. Such policies of ongoing government budget deficits may persist for decades. As the U.S. experience from the end of World War II up to about 1980 shows, it is perfectly possible to run budget deficits almost every year for decades, but as long as the percentage increases in debt are smaller than the percentage growth of GDP, the debt/GDP ratio will decline at the same time.

Nothing in this argument is a claim that budget deficits are always a wise policy. In the short run, a government that runs a very large budget deficit can shift aggregate demand to the right and trigger severe inflation. Additionally, governments may borrow for foolish or impractical reasons. The Impacts of Government Borrowing will discuss how large budget deficits, by reducing national saving, can in certain cases reduce economic growth and even contribute to international financial crises. A requirement that the budget be balanced in each calendar year, however, is a misguided overreaction to the fear that in some cases, budget deficits can become too large.

BRING IT HOME

No Yellowstone Park?

The 2013 federal budget shutdown illustrated the many sides to fiscal policy and the federal budget. In 2013, Republicans and Democrats could not agree on which spending policies to fund and how large the government debt should be. Due to the severity of the 2008-2009 recession, the fiscal stimulus, and previous policies, the federal budget deficit and debt was historically high. One way to try to cut federal spending and borrowing was to refuse to raise the legal federal debt limit, or tie on conditions to appropriation bills to stop the Affordable Health Care Act. This disagreement led to a two-week federal government shutdown and got close to the deadline where the federal government would default on its Treasury bonds. Finally, however, a compromise emerged and the government avoided default. This shows clearly how closely fiscal policies are tied to politics.

Key Terms

automatic stabilizers tax and spending rules that have the effect of slowing down the rate of decrease in aggregate demand when the economy slows down and restraining aggregate demand when the economy speeds up, without any additional change in legislation
balanced budget when government spending and taxes are equal
budget deficit when the federal government spends more money than it receives in taxes in a given year
budget surplus when the government receives more money in taxes than it spends in a year
contractionary fiscal policy fiscal policy that decreases the level of aggregate demand, either through cuts in government spending or increases in taxes
corporate income tax a tax imposed on corporate profits
crowding out federal spending and borrowing causes interest rates to rise and business investment to fall
discretionary fiscal policy the government passes a new law that explicitly changes overall tax or spending levels with the intent of influencing the level of overall economic activity
estate and gift tax a tax on people who pass assets to the next generation—either after death or during life in the form of gifts
excise tax a tax on a specific good—on gasoline, tobacco, and alcohol
expansionary fiscal policy fiscal policy that increases the level of aggregate demand, either through increases in government spending or cuts in taxes
implementation lag the time it takes for the funds relating to fiscal policy to be dispersed to the appropriate agencies to implement the programs
individual income tax a tax based on the income, of all forms, received by individuals
legislative lag the time it takes to get a fiscal policy bill passed
marginal tax rates or the tax that must be paid on all yearly income
national debt the total accumulated amount the government has borrowed, over time, and not yet paid back
payroll tax a tax based on the pay received from employers; the taxes provide funds for Social Security and Medicare
progressive tax a tax that collects a greater share of income from those with high incomes than from those with lower incomes
proportional tax a tax that is a flat percentage of income earned, regardless of level of income
recognition lag the time it takes to determine that a recession has occurred
regressive tax a tax in which people with higher incomes pay a smaller share of their income in tax
standardized employment budget the budget deficit or surplus in any given year adjusted for what it would have been if the economy were producing at potential GDP

Key Concepts and Summary

30.1 Government Spending

Fiscal policy is the set of policies that relate to federal government spending, taxation, and borrowing. In recent decades, the level of federal government spending and taxes, expressed as a share of GDP, has not changed much, typically fluctuating between about 18% to 22% of GDP. However, the level of state spending and taxes, as a share of GDP, has risen from about 12–13% to about 20% of GDP over the last four decades. The four main areas of federal spending are national defense, Social Security, healthcare, and interest payments, which together account for about 70% of all federal spending. When a government spends more than it collects in taxes, it is said to have a budget deficit. When a government collects more in taxes than it spends, it is said to have a budget surplus. If government spending and taxes are equal, it is said to have a balanced budget. The sum of all past deficits and surpluses make up the government debt.

30.2 Taxation

The two main federal taxes are individual income taxes and payroll taxes that provide funds for Social Security and Medicare; these taxes together account for more than 80% of federal revenues. Other federal taxes include

the corporate income tax, excise taxes on alcohol, gasoline and tobacco, and the estate and gift tax. A progressive tax is one, like the federal income tax, where those with higher incomes pay a higher share of taxes out of their income than those with lower incomes. A proportional tax is one, like the payroll tax for Medicare, where everyone pays the same share of taxes regardless of income level. A regressive tax is one, like the payroll tax (above a certain threshold) that supports Social Security, where those with high income pay a lower share of income in taxes than those with lower incomes.

30.3 Federal Deficits and the National Debt

For most of the twentieth century, the U.S. government took on debt during wartime and then paid down that debt slowly in peacetime. However, it took on quite substantial debts in peacetime in the 1980s and early 1990s, before a brief period of budget surpluses from 1998 to 2001, followed by a return to annual budget deficits since 2002, with very large deficits in the recession of 2008 and 2009. A budget deficit or budget surplus is measured annually. Total government debt or national debt is the sum of budget deficits and budget surpluses over time.

30.4 Using Fiscal Policy to Fight Recession, Unemployment, and Inflation

Expansionary fiscal policy increases the level of aggregate demand, either through increases in government spending or through reductions in taxes. Expansionary fiscal policy is most appropriate when an economy is in recession and producing below its potential GDP. Contractionary fiscal policy decreases the level of aggregate demand, either through cuts in government spending or increases in taxes. Contractionary fiscal policy is most appropriate when an economy is producing above its potential GDP.

30.5 Automatic Stabilizers

Fiscal policy is conducted both through discretionary fiscal policy, which occurs when the government enacts taxation or spending changes in response to economic events, or through automatic stabilizers, which are taxing and spending mechanisms that, by their design, shift in response to economic events without any further legislation. The standardized employment budget is the calculation of what the budget deficit or budget surplus would have been in a given year if the economy had been producing at its potential GDP in that year. Many economists and politicians criticize the use of fiscal policy for a variety of reasons, including concerns over time lags, the impact on interest rates, and the inherently political nature of fiscal policy. We cover the critique of fiscal policy in the next module.

30.6 Practical Problems with Discretionary Fiscal Policy

Because fiscal policy affects the quantity of money that the government borrows in financial capital markets, it not only affects aggregate demand—it can also affect interest rates. If an expansionary fiscal policy also causes higher interest rates, then firms and households are discouraged from borrowing and spending, reducing aggregate demand in a situation called crowding out. Given the uncertainties over interest rate effects, time lags (implementation lag, legislative lag, and recognition lag), temporary and permanent policies, and unpredictable political behavior, many economists and knowledgeable policymakers have concluded that discretionary fiscal policy is a blunt instrument and better used only in extreme situations.

30.7 The Question of a Balanced Budget

Balanced budget amendments are a popular political idea, but the economic merits behind such proposals are questionable. Most economists accept that fiscal policy needs to be flexible enough to accommodate unforeseen expenditures, such as wars or recessions. While persistent, large budget deficits can indeed be a problem, a balanced budget amendment prevents even small, temporary deficits that might, in some cases, be necessary.

Self-Check Questions

1. When governments run budget deficits, how do they make up the differences between tax revenue and spending?
2. When governments run budget surpluses, what is done with the extra funds?
3. Is it possible for a nation to run budget deficits and still have its debt/GDP ratio fall? Explain your answer. Is it possible for a nation to run budget surpluses and still have its debt/GDP ratio rise? Explain your answer.
4. Suppose that gifts were taxed at a rate of 10% for amounts up to $100,000 and 20% for anything over that amount. Would this tax be regressive or progressive?
5. If an individual owns a corporation for which he is the only employee, which different types of federal tax will he have to pay?
6. What taxes would an individual pay if he were self-employed and the business is not incorporated?
7. The social security tax is 6.2% on employees' income earned below $113,000. Is this tax progressive, regressive or proportional?
8. Debt has a certain self-reinforcing quality to it. There is one category of government spending that automatically increases along with the federal debt. What is it?
9. True or False:
   a. Federal spending has grown substantially in recent decades.
   b. By world standards, the U.S. government controls a relatively large share of the U.S. economy.
   c. A majority of the federal government's revenue is collected through personal income taxes.
   d. Education spending is slightly larger at the federal level than at the state and local level.
   e. State and local government spending has not risen much in recent decades.
   f. Defense spending is higher now than ever.
   g. The share of the economy going to federal taxes has increased substantially over time.
   h. Foreign aid is a large portion, although less than half, of federal spending.
   i. Federal deficits have been very large for the last two decades.
   j. The accumulated federal debt as a share of GDP is near an all-time high.
10. What is the main reason for employing contractionary fiscal policy in a time of strong economic growth?
11. What is the main reason for employing expansionary fiscal policy during a recession?
12. In a recession, does the actual budget surplus or deficit fall above or below the standardized employment budget?
13. What is the main advantage of automatic stabilizers over discretionary fiscal policy?
14. Explain how automatic stabilizers work, both on the taxation side and on the spending side, first in a situation where the economy is producing less than potential GDP and then in a situation where the economy is producing more than potential GDP.
15. What would happen if expansionary fiscal policy was implemented in a recession but, due to lag, did not actually take effect until after the economy was back to potential GDP?
16. What would happen if contractionary fiscal policy were implemented during an economic boom but, due to lag, it did not take effect until the economy slipped into recession?
17. Do you think the typical time lag for fiscal policy is likely to be longer or shorter than the time lag for monetary policy? Explain your answer?

18. How would a balanced budget amendment affect a decision by Congress to grant a tax cut during a recession?

19. How would a balanced budget amendment change the effect of automatic stabilizer programs?

Review Questions

20. Give some examples of changes in federal spending and taxes by the government that would be fiscal policy and some that would not.

21. Have the spending and taxes of the U.S. federal government generally had an upward or a downward trend in the last few decades?

22. What are the main categories of U.S. federal government spending?

23. What is the difference between a budget deficit, a balanced budget, and a budget surplus?

24. Have spending and taxes by state and local governments in the United States had a generally upward or downward trend in the last few decades?

25. What are the main categories of U.S. federal government taxes?

26. What is the difference between a progressive tax, a proportional tax, and a regressive tax?

27. What has been the general pattern of U.S. budget deficits in recent decades?

28. What is the difference between a budget deficit and the national debt?

29. What is the difference between expansionary fiscal policy and contractionary fiscal policy?

30. Under what general macroeconomic circumstances might a government use expansionary fiscal policy? When might it use contractionary fiscal policy?

31. What is the difference between discretionary fiscal policy and automatic stabilizers?

32. Why do automatic stabilizers function “automatically?”

33. What is the standardized employment budget?

34. What are some practical weaknesses of discretionary fiscal policy?

35. What are some of the arguments for and against a requirement that the federal government budget be balanced every year?

Critical Thinking Questions

36. Why is government spending typically measured as a percentage of GDP rather than in nominal dollars?

37. Why are expenditures such as crime prevention and education typically done at the state and local level rather than at the federal level?

38. Why is spending by the U.S. government on scientific research at NASA fiscal policy while spending by the University of Illinois is not fiscal policy? Why is a cut in the payroll tax fiscal policy whereas a cut in a state income tax is not fiscal policy?

39. Excise taxes on tobacco and alcohol and state sales taxes are often criticized for being regressive. Although everyone pays the same rate regardless of income, why might this be so?

40. What is the benefit of having state and local taxes on income instead of collecting all such taxes at the federal level?

41. In a booming economy, is the federal government more likely to run surpluses or deficits? What are the various factors at play?

42. Economist Arthur Laffer famously pointed out that, in some cases, income tax revenue can actually go up when tax rates go down. Why might this be the case?

43. Is it possible for a nation to run budget deficits and still have its debt/GDP ratio fall? Explain your answer. Is it possible for a nation to run budget surpluses and still have its debt/GDP ratio rise? Explain your answer.

44. How will cuts in state budget spending affect federal expansionary policy?

45. Is expansionary fiscal policy more attractive to politicians who believe in larger government or to politicians who believe in smaller government? Explain your answer.

46. Is Medicaid (federal government aid to low-income families and individuals) an automatic stabilizer?

47. What is a potential problem with a temporary tax decrease designed to increase aggregate demand if people know that it is temporary?

48. If the government gives a $300 tax cut to everyone in the country, explain the mechanism by which this will cause interest rates to rise.

49. Do you agree or disagree with this statement: "It is in the best interest of our economy for Congress and the President to run a balanced budget each year." Explain your answer.

50. During the Great Recession of 2008–2009, what actions would have been required of Congress and the President had a balanced budget amendment to the Constitution been ratified? What impact would that have had on the unemployment rate?

Problems

51. A government starts off with a total debt of $3.5 billion. In year one, the government runs a deficit of $400 million. In year two, the government runs a deficit of $1 billion. In year three, the government runs a surplus of $200 million. What is the total debt of the government at the end of year three?

52. If a government runs a budget deficit of $10 billion dollars each year for ten years, then a surplus of $1 billion for five years, and then a balanced budget for another ten years, what is the government debt?

53. Specify whether expansionary or contractionary fiscal policy would seem to be most appropriate in response to each of the situations below and sketch a diagram using aggregate demand and aggregate supply curves to illustrate your answer:

a. A recession.
b. A stock market collapse that hurts consumer and business confidence.
c. Extremely rapid growth of exports.
d. Rising inflation.
e. A rise in the natural rate of unemployment.
f. A rise in oil prices.

The Impacts of Government Borrowing

31

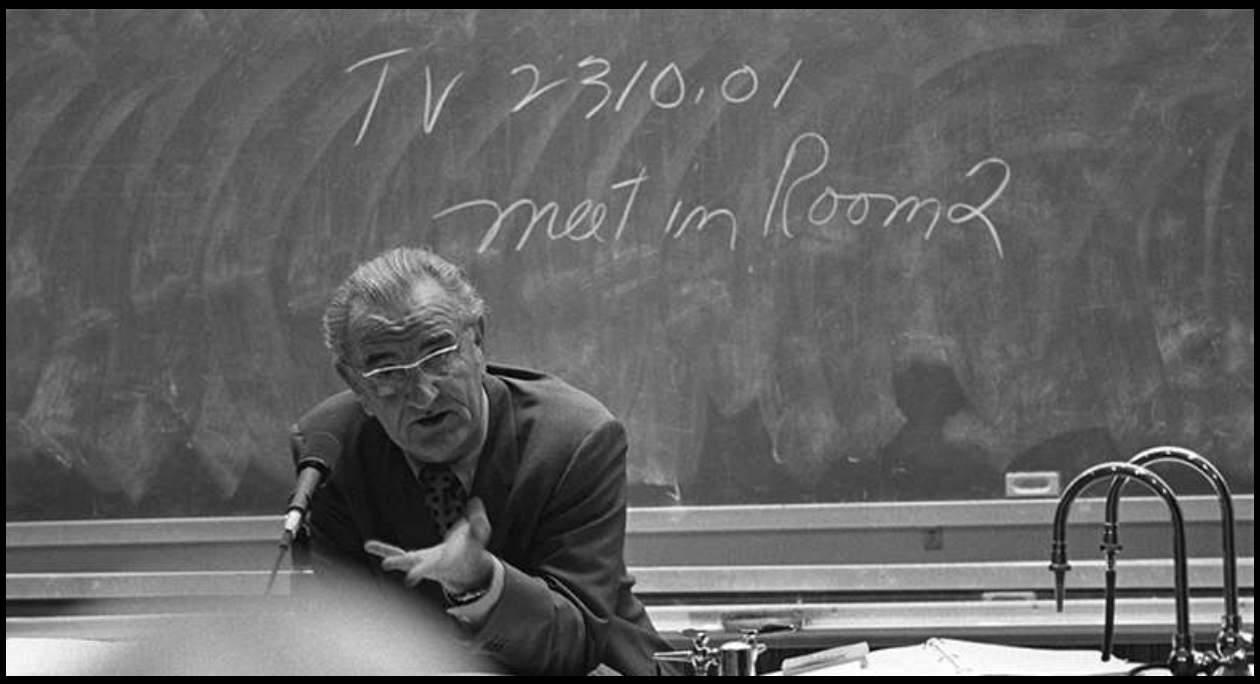

FIGURE 31.1 President Lyndon B. Johnson President Lyndon Johnson played a pivotal role in financing higher education. (Credit: modification of "Lyndon Johnson in 1970" by LBJ Museum & Library, Public Domain)

CHAPTER OBJECTIVES

In this chapter, you will learn about:

- How Government Borrowing Affects Investment and the Trade Balance
- Fiscal Policy, Investment, and Economic Growth
- How Government Borrowing Affects Private Saving
- Fiscal Policy and the Trade Balance

Introduction to the Impacts of Government Borrowing

BRING IT HOME

Financing Higher Education

On November 8, 1965, President Lyndon B. Johnson signed The Higher Education Act of 1965 into law. With a stroke of the pen, he implemented what we know as the financial aid, work study, and student loan programs to help Americans pay for a college education. In his remarks, the President said:

> Here the seeds were planted from which grew my firm conviction that for the individual, education is the path to achievement and fulfillment; for the Nation, it is a path to a society that is not only free but civilized; and for the world, it is the path to peace—for it is education that places reason over force.

This Act, he said, "is responsible for funding higher education for millions of Americans. It is the embodiment of the United States' investment in 'human capital'." Since Johnson signed the Act into law, the government has renewed it several times.

The purpose of The Higher Education Act of 1965 was to build the country's human capital by creating educational opportunity for millions of Americans. The three criteria that the government uses to judge eligibility are income, full-time or part-time attendance, and the cost of the institution. According to education.org, in the 2011–2012 school year, over 80% of all full-time college students received some form of federal financial aid; 43% received grants; and another 41% of students aged 15–23 received federal government student loans. The budget to support financial aid has increased not only because of more enrollment, but also because of increased tuition and fees for higher education. In 2022, the government generally took an approach of increasing student aid through programs such as Pell Grant expansion, while also taking steps to ease student loan debt.

Governments have many competing demands for financial support. Any spending should be tempered by fiscal responsibility and by looking carefully at the spending's impact. When a government spends more than it collects in taxes, it runs a budget deficit. It then needs to borrow. When government borrowing becomes especially large and sustained, it can substantially reduce the financial capital available to private sector firms, as well as lead to trade imbalances and even financial crises.

The Government Budgets and Fiscal Policy chapter introduced the concepts of deficits and debt, as well as how a government could use fiscal policy to address recession or inflation. This chapter begins by building on the national savings and investment identity, which we first introduced in The International Trade and Capital Flows chapter, to show how government borrowing affects firms' physical capital investment levels and trade balances. A prolonged period of budget deficits may lead to lower economic growth, in part because the funds that the government borrows to fund its budget deficits are typically no longer available for private investment. Moreover, a sustained pattern of large budget deficits can lead to disruptive economic patterns of high inflation, substantial inflows of financial capital from abroad, plummeting exchange rates, and heavy strains on a country's banking and financial system.

31.1 How Government Borrowing Affects Investment and the Trade Balance

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Explain the national saving and investment identity in terms of demand and supply
- Evaluate the role of budget surpluses and trade surpluses in national saving and investment identity

When governments are borrowers in financial markets, there are three possible sources for the funds from a macroeconomic point of view: (1) households might save more; (2) private firms might borrow less; and (3) the additional funds for government borrowing might come from outside the country, from foreign financial investors. Let's begin with a review of why one of these three options must occur, and then explore how interest rates and exchange rates adjust to these connections.

The National Saving and Investment Identity

The national saving and investment identity, which we first introduced in The International Trade and Capital Flows chapter, provides a framework for showing the relationships between the sources of demand and supply in financial capital markets. The identity begins with a statement that must always hold true: the quantity of financial capital supplied in the market must equal the quantity of financial capital demanded.

The U.S. economy has two main sources for financial capital: private savings from inside the U.S. economy and public savings.

$$\text{Total savings} = \text{Private savings (S)} + \text{Public savings (T} - \text{G)}$$

These include the inflow of foreign financial capital from abroad. The inflow of savings from abroad is, by definition, equal to the trade deficit, as we explained in The International Trade and Capital Flows chapter. We can write this inflow of foreign investment capital as imports (M) minus exports (X). There are also two main sources of demand for financial capital: private sector investment (I) and government borrowing. Government

borrowing in any given year is equal to the budget deficit, which we can write as the difference between government spending (G) and net taxes (T). Let's call this equation 1.

$$\text{Quantity supplied of financial capital} = \text{Quantity demanded of financial capital}$$
$$\text{Private savings} + \text{Inflow of foreign savings} = \text{Private investment} + \text{Government budget deficit}$$
$$S + (M - X) = I + (G - T)$$

Governments often spend more than they receive in taxes and, therefore, public savings (T – G) is negative. This causes a need to borrow money in the amount of (G – T) instead of adding to the nation's savings. If this is the case, we can view governments as demanders of financial capital instead of suppliers. In algebraic terms, we can rewrite the national savings and investment identity like this:

$$\text{Private investment} = \text{Private savings} + \text{Public savings} + \text{Trade deficit}$$
$$I = S + (T - G) + (M - X)$$

Let's call this equation 2. We must accompany a change in any part of the national saving and investment identity by offsetting changes in at least one other part of the equation because we assume that the equality of quantity supplied and quantity demanded always holds. If the government budget deficit changes, then either private saving or investment or the trade balance—or some combination of the three—must change as well. Figure 31.2 shows the possible effects.

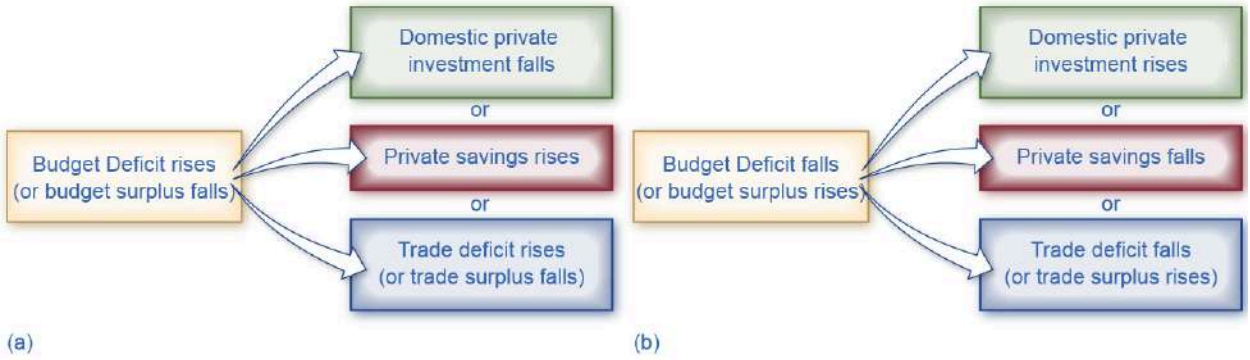

FIGURE 31.2 Effects of Change in Budget Surplus or Deficit on Investment, Savings, and The Trade Balance Chart (a) shows the potential results when the budget deficit rises (or budget surplus falls). Chart (b) shows the potential results when the budget deficit falls (or budget surplus rises).

What about Budget Surpluses and Trade Surpluses?

The national saving and investment identity must always hold true because, by definition, the quantity supplied and quantity demanded in the financial capital market must always be equal. However, the formula will look somewhat different if the government budget is in deficit rather than surplus or if the balance of trade is in surplus rather than deficit. For example, in 1999 and 2000, the U.S. government had budget surpluses, although the economy was still experiencing trade deficits. When the government was running budget surpluses, it was acting as a saver rather than a borrower, and supplying rather than demanding financial capital. As a result, we would write the national saving and investment identity during this time as:

$$\text{Quantity supplied of financial capital} = \text{Quantity demanded of financial capital}$$
$$\text{Private savings} + \text{Trade deficit} + \text{Government surplus} = \text{Private investment}$$
$$S + (M - X) + (T - G) = I$$

Let's call this equation 3. Notice that this expression is mathematically the same as equation 2 except the savings and investment sides of the identity have simply flipped sides.

During the 1960s, the U.S. government was often running a budget deficit, but the economy was typically running trade surpluses. Since a trade surplus means that an economy is experiencing a net outflow of

financial capital, we would write the national saving and investment identity as:

$$\text{Quantity supplied of financial capital} = \text{Quantity demanded of financial capital}$$
$$\text{Private savings} = \text{Private investment} + \text{Outflow of foreign savings} + \text{Government budget deficit}$$
$$S = I + (X - M) + (G - T)$$

Instead of the balance of trade representing part of the supply of financial capital, which occurs with a trade deficit, a trade surplus represents an outflow of financial capital leaving the domestic economy and invested elsewhere in the world.

$$\text{Quantity supplied of financial capital} = \text{Quantity demanded of financial capital demand}$$
$$\text{Private savings} = \text{Private investment} + \text{Government budget deficit} + \text{Trade surplus}$$
$$S = I + (G - T) + (X - M)$$

We assume that the point to these equations is that the national saving and investment identity always hold. When you write these relationships, it is important to engage your brain and think about what is on the supply and demand side of the financial capital market before you start your calculations.

As you can see in Figure 31.3, the Office of Management and Budget shows that the United States has consistently run budget deficits since 1977, with the exception of 1999 and 2000. What is alarming is the dramatic increase in budget deficits that has occurred since 2008, which in part reflects declining tax revenues and increased safety net expenditures due to the Great Recession. While deficits were controlled as the economy began to recover in the mid-2010s, the budget deficit increased again in 2020 during the pandemic, and forecasters expect deficits to remain high for the foreseeable future. (Recall that T is net taxes. When the government must transfer funds back to individuals for safety net expenditures like Social Security and unemployment benefits, budget deficits rise.) These deficits have implications for the future health of the U.S. economy.

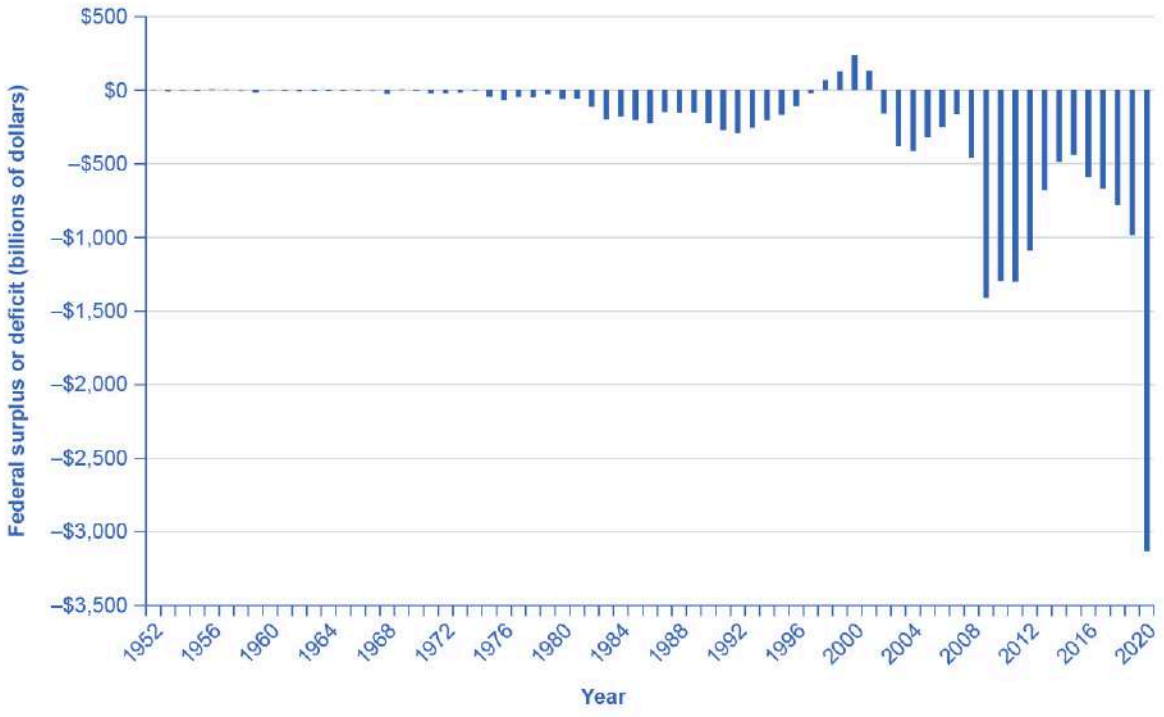

FIGURE 31.3 United States On-Budget, Surplus, and Deficit, 1952–2020 ($ billions) The United States has run a budget deficit for over 30 years, with the exception of 1999 and 2000. Military expenditures, entitlement programs, and the decrease in tax revenue coupled with increased safety net support during the Great Recession are major

contributors to the dramatic increases in the deficit after 2008. (Source: Office of Management and Budget, https://fred.stlouisfed.org/series/FYFSGDA188S)

A rising budget deficit may result in a fall in domestic investment, a rise in private savings, or a rise in the trade deficit. The following modules discuss each of these possible effects in more detail.

31.2 Fiscal Policy and the Trade Balance

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Discuss twin deficits as they related to budget and trade deficit
- Explain the relationship between budget deficits and exchange rates
- Explain the relationship between budget deficits and inflation
- Identify causes of recessions

Government budget balances can affect the trade balance. As The Keynesian Perspective chapter discusses, a net inflow of foreign financial investment always accompanies a trade deficit, while a net outflow of financial investment always accompanies a trade surplus. One way to understand the connection from budget deficits to trade deficits is that when government creates a budget deficit with some combination of tax cuts or spending increases, it will increase aggregate demand in the economy, and some of that increase in aggregate demand will result in a higher level of imports. A higher level of imports, with exports remaining fixed, will cause a larger trade deficit. That means foreigners' holdings of dollars increase as Americans purchase more imported goods. Foreigners use those dollars to invest in the United States, which leads to an inflow of foreign investment. One possible source of funding our budget deficit is foreigners buying Treasury securities that the U.S. government sells, thus a trade deficit often accompanies a budget deficit.

Twin Deficits?

In the mid-1980s, it was common to hear economists and even newspaper articles refer to the twin deficits, as the budget deficit and trade deficit both grew substantially. Figure 31.4 shows the pattern. The federal budget deficit went from 2.6% of GDP in 1981 to 5.1% of GDP in 1985—a drop of 2.5% of GDP. Over that time, the trade deficit moved from 0.5% in 1981 to 2.9% in 1985—a drop of 2.4% of GDP. In the mid-1980s an inflow of foreign investment capital matched, the considerable increase in government borrowing, so the government budget deficit and the trade deficit moved together.

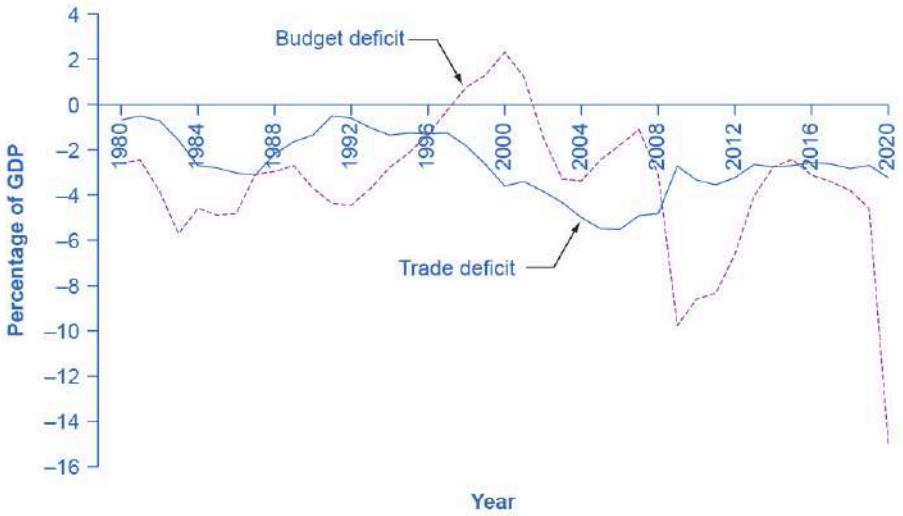

FIGURE 31.4 U.S. Budget Deficits and Trade Deficits In the 1980s, the budget deficit and the trade deficit declined at the same time. However, since then, the deficits have stopped being twins. The trade deficit grew smaller in the early 1990s as the budget deficit increased, and then the trade deficit grew larger in the late 1990s as the budget

deficit turned into a surplus. In the first half of the 2000s, both budget and trade deficits increased. However, in 2009, the trade deficit declined as the budget deficit increased. Through the 2010s, the trade deficit remained relatively stable as the budget deficit declined. While the budget deficit increased in 2020, there has been hardly any change in the trade deficit.

Of course, no one should expect the budget deficit and trade deficit to move in lockstep, because the other parts of the national saving and investment identity—investment and private savings—will often change as well. In the late 1990s, for example, the government budget balance turned from deficit to surplus, but the trade deficit remained large and growing. During this time, the inflow of foreign financial investment was supporting a surge of physical capital investment by U.S. firms. In the first half of the 2000s, the budget and trade deficits again increased together, but in 2009, the budget deficit increased while the trade deficit declined. Through the 2010s, as there were bigger changes in the budget deficit, the trade deficit remained stable. The budget deficit and the trade deficits are related to each other, but they are more like cousins than twins.

Budget Deficits and Exchange Rates

Exchange rates can also help to explain why budget deficits are linked to trade deficits. Figure 31.5 shows a situation using the exchange rate for the U.S. dollar, measured in euros. At the original equilibrium (E_0), where the demand for U.S. dollars (D_0) intersects with the supply of U.S. dollars (S_0) on the foreign exchange market, the exchange rate is 0.9 euros per U.S. dollar and the equilibrium quantity traded in the market is $100 billion per day. Then the U.S. budget deficit rises and foreign financial investment provides the source of funds for that budget deficit.

International financial investors, as a group, will demand more U.S. dollars on foreign exchange markets to purchase the U.S. government bonds, and they will supply fewer of the U.S. dollars that they already hold in these markets. Demand for U.S. dollars on the foreign exchange market shifts from D_0 to D_1 and the supply of U.S. dollars falls from S_0 to S_1. At the new equilibrium (E_1), the exchange rate has appreciated to 1.05 euros per dollar while, in this example, the quantity of dollars traded remains the same.

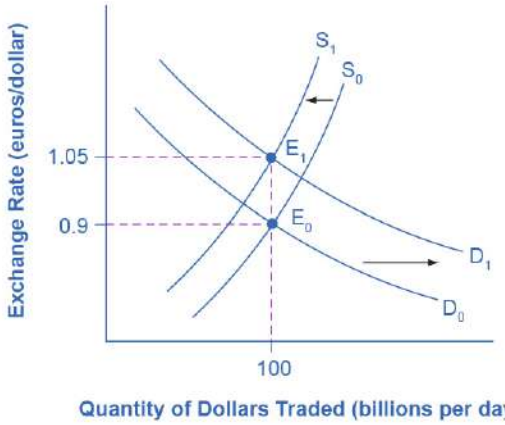

FIGURE 31.5 Budget Deficits and Exchange Rates Imagine that the U.S. government increases its borrowing and the funds come from European financial investors. To purchase U.S. government bonds, those European investors will need to demand more U.S. dollars on foreign exchange markets, causing the demand for U.S. dollars to shift to the right from D_0 to D_1. European financial investors as a group will also be less likely to supply U.S. dollars to the foreign exchange markets, causing the supply of U.S. dollars to shift from S_0 to S_1. The equilibrium exchange rate strengthens from 0.9 euro/ dollar at E_0 to 1.05 euros/dollar at E_1.

A stronger exchange rate, of course, makes it more difficult for exporters to sell their goods abroad while making imports cheaper, so a trade deficit (or a reduced trade surplus) results. Thus, a budget deficit can easily result in an inflow of foreign financial capital, a stronger exchange rate, and a trade deficit.

You can also imagine interest rates are driving the exchange rate appreciation. As we explained earlier in Figure 31.8, a budget deficit increases demand in markets for domestic financial capital, raising the domestic interest rate. A higher interest rate will attract an inflow of foreign financial capital, and appreciate the exchange rate in response to the increase in demand for U.S. dollars by foreign investors and a decrease in supply of U. S. dollars. Because of higher interest rates in the United States, Americans find U.S. bonds more attractive than foreign bonds. When Americans are buying fewer foreign bonds, they are supplying fewer U.S. dollars. U.S. dollar appreciation leads to a larger trade deficit (or reduced surplus). The connections between inflows of foreign investment capital, interest rates, and exchange rates are all just different ways of drawing the same economic connections: a larger budget deficit can result in a larger trade deficit, although do not expect the connection to be one-to-one.

From Budget Deficits to International Economic Crisis

We lay out step-by-step the economic story of how an outflow of international financial capital can cause a deep recession in the Exchange Rates and International Capital Flows chapter. When international financial investors decide to withdraw their funds from a country like Turkey, they increase the supply of the Turkish lira and reduce the demand for lira, depreciating the lira exchange rate. When firms and the government in a country like Turkey borrow money in international financial markets, they typically do so in stages. First, banks in Turkey borrow in a widely used currency like U.S. dollars or euros, then convert those U.S. dollars to lira, and then lend the money to borrowers in Turkey. If the lira's exchange rate value depreciates, then Turkey's banks will find it impossible to repay the international loans that are in U.S. dollars or euros.

The combination of less foreign investment capital and banks that are bankrupt can sharply reduce aggregate demand, which causes a deep recession. Many countries around the world have experienced this kind of recession: along with Turkey in 2002, Mexico followed this general pattern in 1995, Thailand and countries across East Asia in 1997–1998, Russia in 1998, and Argentina in 2002. In many of these countries, large government budget deficits played a role in setting the stage for the financial crisis. A moderate increase in a budget deficit that leads to a moderate increase in a trade deficit and a moderate appreciation of the exchange rate is not necessarily a cause for concern. However, beyond some point that is hard to define in advance, a series of large budget deficits can become a cause for concern among international investors.

One reason for concern is that extremely large budget deficits mean that aggregate demand may shift so far to the right as to cause high inflation. The example of Turkey is a situation where very large budget deficits brought inflation rates well into double digits. In addition, very large budget deficits at some point begin to raise a fear that the government would not repay the borrowing. In the last 100 years, the government of Turkey has been unable to pay its debts and defaulted on its loans four times. Over the past 175 years, Brazil's government has been unable to pay its debts and defaulted on its loans seven times; Venezuela, nine times; and Argentina, five times. The risk of high inflation or a default on repaying international loans will worry international investors, since both factors imply that the rate of return on their investments in that country may end up lower than expected. If international investors start withdrawing the funds from a country rapidly, the scenario of less investment, a depreciated exchange rate, widespread bank failure, and deep recession can occur. The following Clear It Up feature explains other impacts of large deficits.

CLEAR IT UP

What are the risks of chronic large deficits in the United States?

If a government runs large budget deficits for a sustained period of time, what can go wrong? According to a recent Brookings Institution report, a key risk of a large budget deficit is that government debt may grow too high compared to the country's GDP growth. As debt grows, the national savings rate will decline, leaving less available in financial capital for private investment. The impact of chronically large budget deficits is as follows:

- As the population ages, there will be an increasing demand for government services that may cause higher

government deficits. Government borrowing and its interest payments will pull resources away from domestic investment in human capital and physical capital that is essential to economic growth.
- Interest rates may start to rise so that the cost of financing government debt will rise as well, creating pressure on the government to reduce its budget deficits through spending cuts and tax increases. These steps will be politically painful, and they will also have a contractionary effect on aggregate demand in the economy.
- Rising percentage of debt to GDP will create uncertainty in the financial and global markets that might cause a country to resort to inflationary tactics to reduce the real value of the debt outstanding. This will decrease real wealth and damage confidence in the country's ability to manage its spending. After all, if the government has borrowed at a fixed interest rate of, say, 5%, and it lets inflation rise above that 5%, then it will effectively be able to repay its debt at a negative real interest rate.

The conventional reasoning suggests that the relationship between sustained deficits that lead to high levels of government debt and long-term growth is negative. How significant this relationship is, how big an issue it is compared to other macroeconomic issues, and the direction of causality, is less clear.

What remains important to acknowledge is that the relationship between debt and growth is negative and that for some countries, the relationship may be stronger than in others. It is also important to acknowledge the direction of causality: does high debt cause slow growth, slow growth cause high debt, or are both high debt and slow growth the result of third factors? In our analysis, we have argued simply that high debt causes slow growth. There may be more to this debate than we have space to discuss here.

Using Fiscal Policy to Address Trade Imbalances

If a nation is experiencing the inflow of foreign investment capital associated with a trade deficit because foreign investors are making long-term direct investments in firms, there may be no substantial reason for concern. After all, many low-income nations around the world would welcome direct investment by multinational firms that ties them more closely into the global networks of production and distribution of goods and services. In this case, the inflows of foreign investment capital and the trade deficit are attracted by the opportunities for a good rate of return on private sector investment in an economy.

However, governments should beware of a sustained pattern of high budget deficits and high trade deficits. The danger arises in particular when the inflow of foreign investment capital is not funding long-term physical capital investment by firms, but instead is short-term portfolio investment in government bonds. When inflows of foreign financial investment reach high levels, foreign financial investors will be on the alert for any reason to fear that the country's exchange rate may decline or the government may be unable to repay what it has borrowed on time. Just as a few falling rocks can trigger an avalanche; a relatively small piece of bad news about an economy can trigger an enormous outflow of short-term financial capital.

Reducing a nation's budget deficit will not always be a successful method of reducing its trade deficit, because other elements of the national saving and investment identity, like private saving or investment, may change instead. In those cases when the budget deficit is the main cause of the trade deficit, governments should take steps to reduce their budget deficits, lest they make their economy vulnerable to a rapid outflow of international financial capital that could bring a deep recession.

31.3 How Government Borrowing Affects Private Saving

LEARNING OBJECTIVES

By the end of this section, you will be able to:
- Apply Ricardian equivalence to evaluate how government borrowing affects private saving
- Interpret a graphic representation of Ricardian equivalence

A change in government budgets may impact private saving. Imagine that people watch government budgets and adjust their savings accordingly. For example, whenever the government runs a budget deficit, people

might reason: "Well, a higher budget deficit means that I'm just going to owe more taxes in the future to pay off all that government borrowing, so I'll start saving now." If the government runs budget surpluses, people might reason: "With these budget surpluses (or lower budget deficits), interest rates are falling, so that saving is less attractive. Moreover, with a budget surplus the country will be able to afford a tax cut sometime in the future. I won't bother saving as much now."

The theory that rational private households might shift their saving to offset government saving or borrowing is known as **Ricardian equivalence** because the idea has intellectual roots in the writings of the early nineteenth-century economist David Ricardo (1772–1823). If Ricardian equivalence holds completely true, then in the national saving and investment identity, any change in budget deficits or budget surpluses would be completely offset by a corresponding change in private saving. As a result, changes in government borrowing would have no effect at all on either physical capital investment or trade balances.

In practice, the private sector only sometimes and partially adjusts its savings behavior to offset government budget deficits and surpluses. Figure 31.6 shows the patterns of U.S. government budget deficits and surpluses and the rate of private saving—which includes saving by both households and firms—since 1980. The connection between the two is not at all obvious. In the mid-1980s, for example, government budget deficits were quite large, but there is no corresponding surge of private saving. However, when budget deficits turn to surpluses in the late 1990s, there is a simultaneous decline in private saving. When budget deficits got very large in 2008 and 2009, there was another a rise in saving. When the deficit increased again in 2020, saving jumped up as well. A variety of statistical studies based on the U.S. experience suggests that when government borrowing increases by $1, private saving rises by about 30 cents. A World Bank study from the late 1990s, looking at government budgets and private saving behavior in countries around the world, found a similar result.

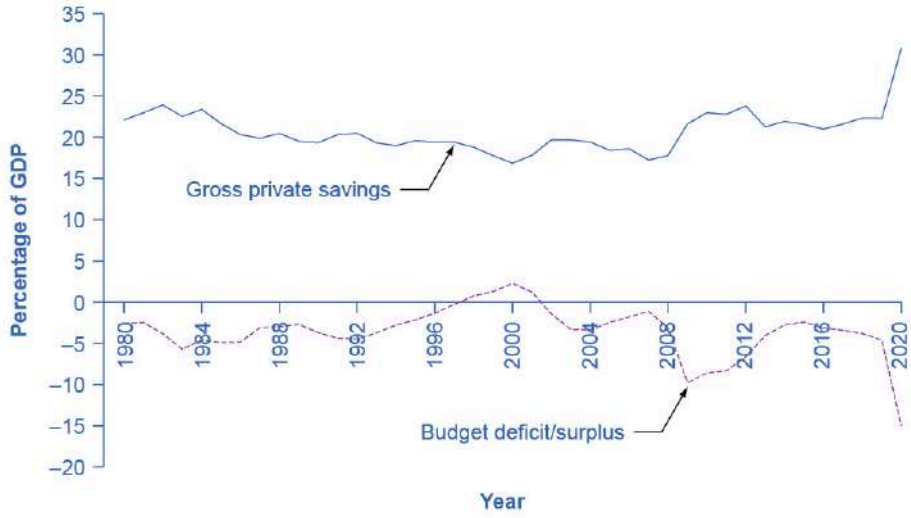

FIGURE 31.6 U.S. Budget Deficits and Private Savings The theory of Ricardian equivalence suggests that additional private saving will offset any increase in government borrowing, while reduced private saving will offset any decrease in government borrowing. Sometimes this theory holds true, and sometimes it does not. (Source: Bureau of Economic Analysis and Federal Reserve Economic Data)

Private saving does increase to some extent when governments run large budget deficits, and private saving falls when governments reduce deficits or run large budget surpluses. However, the offsetting effects of private saving compared to government borrowing are much less than one-to-one. In addition, this effect can vary a great deal from country to country, from time to time, and over the short and the long run.

If the funding for a larger budget deficit comes from international financial investors, then a trade deficit may accompany a budget deficit. In some countries, this pattern of **twin deficits** has set the stage for international financial investors first to send their funds to a country and cause an appreciation of its exchange rate and

then to pull their funds out and cause a depreciation of the exchange rate and a financial crisis as well. It depends on whether funding comes from international financial investors.

31.4 Fiscal Policy, Investment, and Economic Growth

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Explain crowding out and its effect on physical capital investment
- Explain the relationship between budget deficits and interest rates
- Identify why economic growth is tied to investments in physical capital, human capital, and technology

The underpinnings of economic growth are investments in physical capital, human capital, and technology, all set in an economic environment where firms and individuals can react to the incentives provided by well-functioning markets and flexible prices. Government borrowing can reduce the financial capital available for private firms to invest in physical capital. However, government spending can also encourage certain elements of long-term growth, such as spending on roads or water systems, on education, or on research and development that creates new technology.

Crowding Out Physical Capital Investment

A larger budget deficit will increase demand for financial capital. If private saving and the trade balance remain the same, then less financial capital will be available for private investment in physical capital. When government borrowing soaks up available financial capital and leaves less for private investment in physical capital, economists call the result crowding out.

To understand the potential impact of crowding out, consider the U.S. economy's situation before the exceptional circumstances of the recession that started in late 2007. In 2005, for example, the budget deficit was roughly 3% of GDP. Private investment by firms in the U.S. economy has hovered in the range of 14% to 18% of GDP in recent decades. However, in any given year, roughly half of U.S. investment in physical capital just replaces machinery and equipment that has worn out or become technologically obsolete. Only about half represents an increase in the total quantity of physical capital in the economy. Investment in new physical capital in any year is about 7% to 9% of GDP. In this situation, even U.S. budget deficits in the range of 3% of GDP can potentially crowd out a substantial share of new investment spending. Conversely, a smaller budget deficit (or an increased budget surplus) increases the pool of financial capital available for private investment.

LINK IT UP

Visit this website (http://openstax.org/l/debtclock) to view the "U.S. Debt Clock."

Figure 31.7 shows the patterns of U.S. budget deficits and private investment since 1980. If greater government deficits lead to less private investment in physical capital, and reduced government deficits or budget surpluses lead to more investment in physical capital, these two lines should move up and down simultaneously. This pattern occurred in the late 1990s and early 2000s. The U.S. federal budget went from a deficit of 2.2% of GDP in 1995 to a budget surplus of 2.4% of GDP in 2000—a swing of 4.6% of GDP. From 1995 to 2000, private investment in physical capital rose from 15% to 18% of GDP—a rise of 3% of GDP. Then, when the U.S. government again started running budget deficits in the early 2000s, less financial capital became available for private investment, and the rate of private investment fell back to about 15% of GDP by 2003. However, in more recent years, in the 2010s after the economy recovered from the Great Recession, private investment as a share of GDP increased even as deficits slightly worsened, especially around 2016. And while the deficit increased substantially in 2020, private investment as a share of GDP did not.

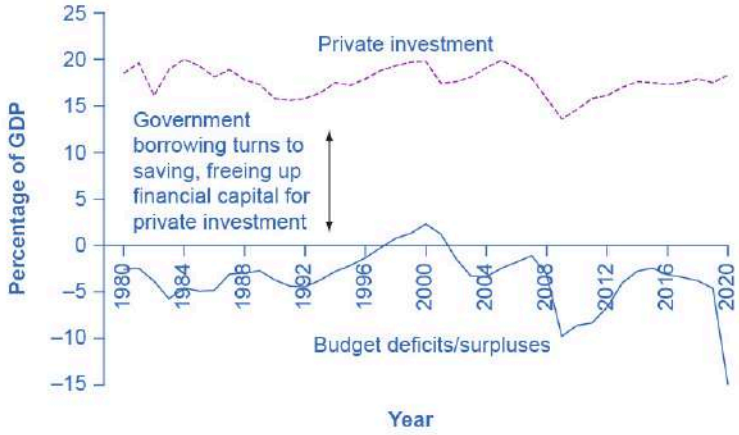

FIGURE 31.7 U.S. Budget Deficits/Surpluses and Private Investment The connection between private savings and flows of international capital plays a role in budget deficits and surpluses. Consequently, government borrowing and private investment sometimes rise and fall together. For example, the 1990s show a pattern in which reduced government borrowing helped to reduce crowding out so that more funds were available for private investment.

This argument does not claim that a government's budget deficits will exactly shadow its national rate of private investment; after all, we must account for private saving and inflows of foreign financial investment. In the mid-1980s, for example, government budget deficits increased substantially without a corresponding drop off in private investment. In 2009, nonresidential private fixed investment dropped by $300 billion from its previous level of $1,941 billion in 2008, primarily because, during a recession, firms lack both the funds and the incentive to invest. Investment growth between 2009 and 2014 averaged approximately 5.9% to $2,210.5 billion—only slightly above its 2008 level, according to the Bureau of Economic Analysis. During that same period, interest rates dropped from 3.94% to less than a quarter percent as the Federal Reserve took dramatic action to prevent a depression by increasing the money supply through lowering short-term interest rates. The "crowding out" of private investment due to government borrowing to finance expenditures appears to have been suspended after the Great Recession.

The Interest Rate Connection

Assume that government borrowing of substantial amounts will have an effect on the quantity of private investment. How will this affect interest rates in financial markets? In Figure 31.8, the original equilibrium (E_0) where the demand curve (D_0) for financial capital intersects with the supply curve (S_0) occurs at an interest rate of 5% and an equilibrium quantity equal to 20% of GDP. However, as the government budget deficit increases, the demand curve for financial capital shifts from D_0 to D_1. The new equilibrium (E_1) occurs at an interest rate of 6% and an equilibrium quantity of 21% of GDP.

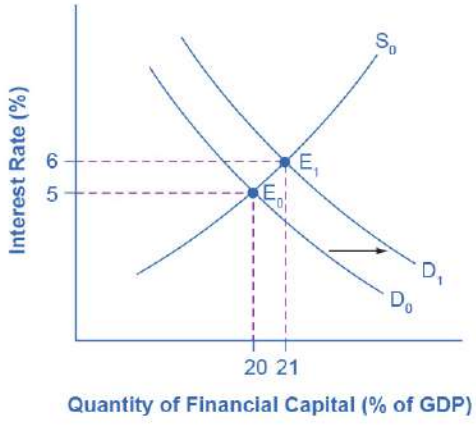

FIGURE 31.8 Budget Deficits and Interest Rates In the financial market, an increase in government borrowing can

shift the demand curve for financial capital to the right from D_0 to D_1. As the equilibrium interest rate shifts from E_0 to E_1, the interest rate rises from 5% to 6% in this example. The higher interest rate is one economic mechanism by which government borrowing can crowd out private investment.

A survey of economic studies on the connection between government borrowing and interest rates in the U.S. economy suggests that an increase of 1% in the budget deficit will lead to a rise in interest rates of between 0.5 and 1.0%, other factors held equal. In turn, a higher interest rate tends to discourage firms from making physical capital investments. One reason government budget deficits crowd out private investment, therefore, is the increase in interest rates. There are, however, economic studies that show a limited connection between the two (at least in the United States), but as the budget deficit grows, the dangers of rising interest rates become more real.

At this point, you may wonder about the Federal Reserve. After all, can the Federal Reserve not use expansionary monetary policy to reduce interest rates, or in this case, to prevent interest rates from rising? This useful question emphasizes the importance of considering how fiscal and monetary policies work in relation to each other. Imagine a central bank faced with a government that is running large budget deficits, causing a rise in interest rates and crowding out private investment. If the budget deficits are increasing aggregate demand when the economy is already producing near potential GDP, threatening an inflationary increase in price levels, the central bank may react with a contractionary monetary policy. In this situation, the higher interest rates from the government borrowing would be made even higher by contractionary monetary policy, and the government borrowing might crowd out a great deal of private investment.

Alternatively, if the budget deficits are increasing aggregate demand when the economy is producing substantially less than potential GDP, an inflationary increase in the price level is not much of a danger and the central bank might react with expansionary monetary policy. In this situation, higher interest rates from government borrowing would be largely offset by lower interest rates from expansionary monetary policy, and there would be little crowding out of private investment.

However, even a central bank cannot erase the overall message of the national savings and investment identity. If government borrowing rises, then private investment must fall, or private saving must rise, or the trade deficit must rise. By reacting with contractionary or expansionary monetary policy, the central bank can only help to determine which of these outcomes is likely.

Public Investment in Physical Capital

Government can invest in physical capital directly: roads and bridges; water supply and sewers; seaports and airports; schools and hospitals; plants that generate electricity, like hydroelectric dams or windmills; telecommunications facilities; and military weapons. In 2021, the United States spent about $146 billion on transportation, including highways, mass transit, and airports. Table 31.1 shows the federal government's total outlay for 2021 for major public physical capital investment in the United States. We have omitted physical capital related to the military or to residences where people live from this table, because the focus here is on public investments that have a direct effect on raising output in the private sector.

Type of Public Physical Capital	Federal Outlays 2014	Federal Outlays 2021
Transportation	$91,915	$146,156
Community and regional development	$20,670	$83,619
Natural resources and the environment	$36,171	$40,691

TABLE 31.1 Grants for Major Physical Capital Investment, 2014 and 2021, in $ Millions (Source: Bureau of Economic Analysis, Table 3.15.5, https://apps.bea.gov/itable/index.cfm).

Type of Public Physical Capital	Federal Outlays 2014	Federal Outlays 2021
Education, training, employment, and social services	$90,615	$236,723
Other	$37,282	$41,227
Total	**$276,653**	**$548,416**

TABLE 31.1 Grants for Major Physical Capital Investment, 2014 and 2021, in $ Millions (Source: Bureau of Economic Analysis, Table 3.15.5, https://apps.bea.gov/itable/index.cfm).

Public physical capital investment of this sort can increase the economy's output and productivity. An economy with reliable roads and electricity will be able to produce more. However, it is hard to quantify how much government investment in physical capital will benefit the economy, because government responds to political as well as economic incentives. When a firm makes an investment in physical capital, it is subject to the discipline of the market: If it does not receive a positive return on investment, the firm may lose money or even go out of business.

In some cases, lawmakers make investments in physical capital as a way of spending money in key politicians' districts. The result may be unnecessary roads or office buildings. Even if a project is useful and necessary, it might be done in a way that is excessively costly, because local contractors who make campaign contributions to politicians appreciate the extra business. Alternatively, governments sometimes do not make the investments they should because a decision to spend on infrastructure does not need to just make economic sense. It must be politically popular as well. Managing public investment cost-effectively can be difficult.

If a government decides to finance an investment in public physical capital with higher taxes or lower government spending in other areas, it need not worry that it is directly crowding out private investment. Indirectly however, higher household taxes could cut down on the level of private savings available and have a similar effect. If a government decides to finance an investment in public physical capital by borrowing, it may end up increasing the quantity of public physical capital at the cost of crowding out investment in private physical capital, which could be more beneficial to the economy.

Public Investment in Human Capital

In most countries, the government plays a large role in society's investment in human capital through the education system. A highly educated and skilled workforce contributes to a higher rate of economic growth. For the low-income nations of the world, additional investment in human capital seems likely to increase productivity and growth. For the United States, critics have raised tough questions about how much increases in government spending on education will improve the actual level of education.

Among economists, discussions of education reform often begin with some uncomfortable facts. As Figure 31.9 shows, spending per student for kindergarten through grade 12 (K–12) increased substantially in real dollars through 2010, declined slightly in 2011 and 2012, and began rising again after that through 2020. However, as measured by standardized tests like the SAT, the level of student academic achievement has barely budged in recent decades. On international tests, U.S. students lag behind students from many other countries. (Of course, test scores are an imperfect measure of education for a variety of reasons. It would be difficult, however, to argue that there are not real problems in the U.S. education system and that the tests are just inaccurate.)

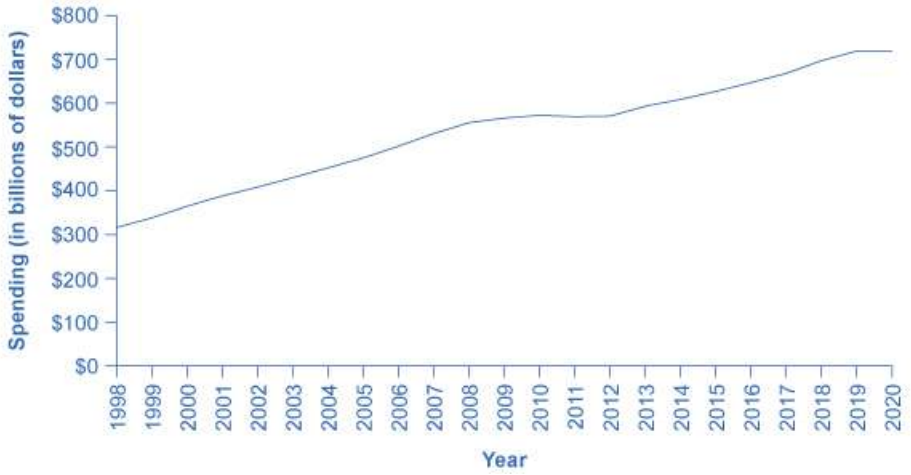

FIGURE 31.9 Total Spending for Elementary, Secondary, and Vocational Education (1998–2020) in the United States The graph shows that government spending on education was continually increasing up until 2006 where it leveled off until 2008 when it increased dramatically. Since 2010, spending has steadily decreased. (Source: Office of Management and Budget)

The fact that increased financial resources have not brought greater measurable gains in student performance has led some education experts to question whether the problems may be due to structure, not just to the resources spent.

Other government programs seek to increase human capital either before or after the K–12 education system. Programs for early childhood education, like the federal **Head Start program**, are directed at families where the parents may have limited educational and financial resources. Government also offers substantial support for universities and colleges. For example, in the United States about 60% of students take at least a few college or university classes beyond the high school level. In Germany and Japan, about half of all students take classes beyond the comparable high school level. In the countries of Latin America, only about one student in four takes classes beyond the high school level, and in the nations of sub-Saharan Africa, only about one student in 20.

Not all spending on educational human capital needs to happen through the government: many college students in the United States pay a substantial share of the cost of their education. If low-income countries of the world are going to experience a widespread increase in their education levels for grade-school children, government spending seems likely to play a substantial role. For the U.S. economy, and for other high-income countries, the primary focus at this time is more on how to get a bigger return from existing spending on education and how to improve the performance of the average high school graduate, rather than dramatic increases in education spending.

How Fiscal Policy Can Improve Technology

Research and development (R&D) efforts are the lifeblood of new technology. According to the National Science Foundation, federal outlays for research, development, and physical plant improvements to various governmental agencies have remained at an average of 8.8% of GDP. About one-fifth of U.S. R&D spending goes to defense and space-oriented research. Although defense-oriented R&D spending may sometimes produce consumer-oriented spinoffs, R&D that is aimed at producing new weapons is less likely to benefit the civilian economy than direct civilian R&D spending.

Fiscal policy can encourage R&D using either direct spending or tax policy. Government could spend more on the R&D that it carries out in government laboratories, as well as expanding federal R&D grants to universities and colleges, nonprofit organizations, and the private sector. By 2014, the federal share of R&D outlays totaled $135.5 billion, or about 4% of the federal government's total budget outlays, according to data from the

National Science Foundation. Fiscal policy can also support R&D through tax incentives, which allow firms to reduce their tax bill as they increase spending on research and development.

Summary of Fiscal Policy, Investment, and Economic Growth

Investment in physical capital, human capital, and new technology is essential for long-term economic growth, as Table 31.2 summarizes. In a market-oriented economy, private firms will undertake most of the investment in physical capital, and fiscal policy should seek to avoid a long series of outsized budget deficits that might crowd out such investment. We will see the effects of many growth-oriented policies very gradually over time, as students are better educated, we make physical capital investments, and man invents and implements new technologies.

	Physical Capital	Human Capital	New Technology
Private Sector	New investment in property and equipment	On-the-job training	Research and development
Public Sector	Public infrastructure	Public education Job training	Research and development encouraged through private sector incentives and direct spending.

TABLE 31.2 Investment Role of Public and Private Sector in a Market Economy

BRING IT HOME

Financing Higher Education

According to the Bureau of Labor Statistics, between 1980 and 2020, the average tuition and fees at a 4-year public university increased from $738 to $9,349. This represents a more than 12-fold increase in this 40 year period. To put this increase into perspective, median yearly household income in the U.S. has increased from about $20,000 to $67,000 during the same time—about a 3.5-fold increase. Clearly, college is becoming increasingly expensive, even as it continues to provide the same benefits that were mentioned at the beginning of this chapter by President Lyndon B. Johnson.

Crucial to the mission of higher education is the Pell Grant program, which was initiated by President Johnson as part of the Higher Education Act of 1965. But Pell Grant amounts have not adequately kept up with the rising costs of college tuition and fees. As part of President Joe Biden's Build Back Better proposal, the maximum Pell Grant award would increase to $7,045 between 2022–2025, representing an 8.5% increase, which is one of the largest 1-year increases in the last 20 years (the largest increase occurred between 2009 and 2010, during President Barack Obama's term in office). The original proposal also aimed to allow for Deferred Action for Childhood Arrivals program participants to benefit from the awards, through 2030.

Key Terms

Head Start program a program for early childhood education directed at families with limited educational and financial resources.

Ricardian equivalence the theory that rational private households might shift their saving to offset government saving or borrowing

twin deficits deficits that occur when a country is running both a trade and a budget deficit

Key Concepts and Summary

31.1 How Government Borrowing Affects Investment and the Trade Balance

A change in any part of the national saving and investment identity suggests that if the government budget deficit changes, then either private savings, private investment in physical capital, or the trade balance—or some combination of the three—must change as well.

31.2 Fiscal Policy and the Trade Balance

The government need not balance its budget every year. However, a sustained pattern of large budget deficits over time risks causing several negative macroeconomic outcomes: a shift to the right in aggregate demand that causes an inflationary increase in the price level; crowding out private investment in physical capital in a way that slows down economic growth; and creating a dependence on inflows of international portfolio investment which can sometimes turn into outflows of foreign financial investment that can be injurious to a macroeconomy.

31.3 How Government Borrowing Affects Private Saving

The theory of Ricardian equivalence holds that changes in private saving will offset changes in government borrowing or saving. Thus, greater private saving will offset higher budget deficits, while greater private borrowing will offset larger budget surpluses. If the theory holds true, then changes in government borrowing or saving would have no effect on private investment in physical capital or on the trade balance. However, empirical evidence suggests that the theory holds true only partially.

31.4 Fiscal Policy, Investment, and Economic Growth

Economic growth comes from a combination of investment in physical capital, human capital, and technology. Government borrowing can crowd out private sector investment in physical capital, but fiscal policy can also increase investment in publicly owned physical capital, human capital (education), and research and development. Possible methods for improving education and society's investment in human capital include spending more money on teachers and other educational resources, and reorganizing the education system to provide greater incentives for success. Methods for increasing research and development spending to generate new technology include direct government spending on R&D and tax incentives for businesses to conduct additional R&D.

Self-Check Questions

1. In a country, private savings equals 600, the government budget surplus equals 200, and the trade surplus equals 100. What is the level of private investment in this economy?

2. Assume an economy has a budget surplus of 1,000, private savings of 4,000, and investment of 5,000.
   a. Write out a national saving and investment identity for this economy.
   b. What will be the balance of trade in this economy?
   c. If the budget surplus changes to a budget deficit of 1000, with private saving and investment unchanged, what is the new balance of trade in this economy?

3. In the late 1990s, the U.S. government moved from a budget deficit to a budget surplus and the trade deficit in the U.S. economy grew substantially. Using the national saving and investment identity, what can you say about the direction in which saving and/or investment must have changed in this economy?

4. Imagine an economy in which Ricardian equivalence holds. This economy has a budget deficit of 50, a trade deficit of 20, private savings of 130, and investment of 100. If the budget deficit rises to 70, how are the other terms in the national saving and investment identity affected?

5. Why have many education experts recently placed an emphasis on altering the incentives that U.S. schools face rather than on increasing their budgets? Without endorsing any of these proposals as especially good or bad, list some of the ways in which incentives for schools might be altered.

6. What are some steps the government can take to encourage research and development?

Review Questions

7. Based on the national saving and investment identity, what are the three ways the macroeconomy might react to greater government budget deficits?

8. How would you expect larger budget deficits to affect private sector investment in physical capital? Why?

9. Under what conditions will a larger budget deficit cause a trade deficit?

10. What is the theory of Ricardian equivalence?

11. What does the concept of rationality have to do with Ricardian equivalence?

12. What are some of the ways fiscal policy might encourage economic growth?

13. What are some fiscal policies for improving a society's human capital?

14. What are some fiscal policies for improving the technologies that the economy will have to draw upon in the future?

15. Explain how cuts in funding for programs such as Head Start might affect the development of human capital in the United States.

Critical Thinking Questions

16. Assume there is no discretionary increase in government spending. Explain how an improving economy will affect the budget balance and, in turn, investment and the trade balance.

17. Explain how decreased domestic investments that occur due to a budget deficit will affect future economic growth.

18. The U.S. government has shut down a number of times in recent history. Explain how a government shutdown will affect the variables in the national investment and savings identity. Could the shutdown affect the government budget deficit?

19. Explain how a shift from a government budget deficit to a budget surplus might affect the exchange rate.

20. Describe how a plan for reducing the government deficit might affect a college student, a young professional, and a middle-income family.

21. Explain whether or not you agree with the premise of the Ricardian equivalence theory that rational people might reason: "Well, a higher budget deficit (surplus) means that I'm just going to owe more (less) taxes in the future to pay off all that government borrowing, so I'll start saving (spending) now." Why or why not?

22. Explain why the government might prefer to provide incentives to private firms to do investment or research and development, rather than simply doing the spending itself?

23. Under what condition would crowding out not inhibit long-run economic growth? Under what condition would crowding out impede long-run economic growth?

24. What must take place for the government to run deficits without any crowding out?

Problems

25. Sketch a diagram of how a budget deficit causes a trade deficit. (*Hint*: Begin with what will happen to the exchange rate when foreigners demand more U.S. government debt.)

26. Sketch a diagram of how sustained budget deficits cause low economic growth.

27. Assume that the newly independent government of Tanzania employed you in 1964. Now free from British rule, the Tanzanian parliament has decided that it will spend 10 million shillings on schools, roads, and healthcare for the year. You estimate that the net taxes for the year are eight million shillings. The government will finance the difference by selling 10-year government bonds at 12% interest per year. Parliament must add the interest on outstanding bonds to government expenditure each year. Assume that Parliament places additional taxes to finance this increase in government expenditure so the gap between government spending is always two million. If the school, road, and healthcare budget are unchanged, compute the value of the accumulated debt in 10 years.

28. Illustrate the concept of Ricardian equivalence using the demand and supply of financial capital graph.

29. During the most recent recession, some economists argued that the change in the interest rates that comes about due to deficit spending implied in the demand and supply of financial capital graph would not occur. A simple reason was that the government was stepping in to invest when private firms were not. Using a graph, explain how the use by government in investment offsets the deficit demand.

Macroeconomic Policy Around the World

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FIGURE 32.1 Looking for Work Job fairs and job centers are often available to help match people to jobs. This fair took place at a college in the U.S., a high-income country with policies to keep unemployment levels in check. Unemployment is an issue that has different causes in different countries, and is especially severe in the low- and middle-income economies around the world. (Credit: modification of "College of DuPage Hosts Career Fair 2015 36" by COD Newsroom/Flickr, CC BY 2.0)

CHAPTER OBJECTIVES

In this chapter, you will learn about:

- The Diversity of Countries and Economies across the World
- Improving Countries' Standards of Living
- Causes of Unemployment around the World
- Causes of Inflation in Various Countries and Regions
- Balance of Trade Concerns

Introduction to Macroeconomic Policy around the World

BRING IT HOME

Youth Unemployment

Chad Harding, a young man from Cape Town, South Africa, completed school having done well on his exams. He had

high hopes for the future. Like many young South Africans, however, he had difficulty finding a job. "I was just stuck at home waiting, waiting for something to come up," he said in a BBC interview. In South Africa over 60% of young adults are unemployed. In fact, the problem is not limited to South Africa. Seventy-three million of the world's youth aged 15 to 24 are currently unemployed, according to the International Labour Organization.

This chapter will look at macroeconomic policies around the world, specifically those related to reducing unemployment, promoting economic growth, and stable inflation and exchange rates.

There are extraordinary differences in the composition and performance of economies across the world. What explains these differences? Are countries motivated by similar goals when it comes to macroeconomic policy? Can we apply the same macroeconomic framework that we developed in this text to understand the performance of these countries? Let's take each of these questions in turn.

Explaining differences: Recall from Unemployment that we explained the difference in composition and performance of economies by appealing to an aggregate production function. We argued that differences in productivity explain the diversity of average incomes across the world, which in turn were affected by inputs such as capital deepening, human capital, and "technology." Every economy has its own distinctive economic characteristics, institutions, history, and political realities, which imply that access to these "ingredients" will vary by country and so will economic performance.

For example, South Korea invested heavily in education and technology to increase agricultural productivity in the early 1950s. Some of this investment came from its historical relationship with the United States. As a result of these and many other institutions, its economy has managed to converge to the levels of income in leading economies like Japan and the United States.

Similar goals and frameworks: Many economies that have performed well in terms of per capita income have—for better or worse—been motivated by a similar goal: to maintain the quality of life of their citizens. Quality of life is a broad term, but as you can imagine it includes but is not limited to such things as low level of unemployment, price stability (low levels of inflation), and the ability to trade. These seem to be universal macroeconomic goals as we discussed in The Macroeconomic Perspective. No country would argue against them. To study macroeconomic policy around the world, we begin by comparing standards of living. In keeping with these goals, we also look at indicators such as unemployment, inflation, and the balance of trade policies across countries. Remember that every country has had a diverse set of experiences; therefore although our goals may be similar, each country may well require macroeconomic policies tailored to its circumstances.

LINK IT UP

For more reading on the topic of youth unemployment, visit this website (http://openstax.org/l/genjobless) to read "Generation Jobless" in the *Economist*.

32.1 The Diversity of Countries and Economies across the World

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Analyze GDP and GNI per capita as a measure of the diversity of international standards of living
- Identify what classifies a country as low income, lower-middle income, upper-middle income, or high income
- Explain how geography, demographics, industry structure, and economic institutions influence standards of living

The national economies that comprise the global economy are remarkably diverse. Let us use one key indicator of the standard of living, GDP per capita, to quantify this diversity. You will quickly see that

quantifying this diversity is fraught with challenges and limitations. As we explained in The Macroeconomic Perspective, we must consider using purchasing power parity or "international dollars" to convert average incomes into comparable units. Purchasing power parity, as we formally defined in Exchange Rates and International Capital Flows, takes into account that prices of the same good are different across countries.

The Macroeconomic Perspective explained how to measure GDP, the challenges of using GDP to compare standards of living, and the difficulty of confusing economic size with distribution. In China's case, for example, China ranks as the second largest global economy, second to only the United States, with Japan ranking third. However, when we take China's GDP of $9.2 trillion and divide it by its population of 1.4 billion, then the per capita GDP is only $6,900, which is significantly lower than that of Japan, at $38,500, and that of the United States, at $52,800. Measurement issues aside, it's worth repeating that the goal, then, is to not only increase GDP, but to strive toward increased GDP per capita to increase overall living standards for individuals. As we have learned from Economic Growth, countries can achieve this at the national level by designing policies that increase worker productivity, deepen capital, and advance technology.

The related measure gross national income (GNI) per capita also allows us to rank countries into high-, upper-middle-, lower-middle-, or low-income groups. The World Bank updates the classifications each year. Low-income countries are those with $1,085 per capita GNI per year; lower-middle-income countries have a per capita GNI between $1,086 and $4,255; upper-middle-income countries have a per capita GDP between $4,265 and $13,205; while high-income countries have over $13,206 per year per capita income. According to the 2022 classifications, there are 27 low-income nations and 80 high-income nations. The other 110 measured nations occupy the two tiers of middle-income nations, and are comprised of the vast majority—75%, of the world's population. Despite the population and quantitative majority, these nations only produce one third of global GNI and have nearly two-thirds of the world's people living in poverty.

Income Group	GDP (in billions)	% of Global GDP	Population (millions)	% of Global Population
Low income ($1,085 or less)	$457.6	0.5%	665.1	8.6%
Lower- and upper-middle income ($1,086–$13,205)	$30,535	36.5%	5,853	75.7%
High income (more than $13,205)	$53,396	63%	1,215	15.7%
World Total income	*$84,388*		*7,773.1*	

TABLE 32.1 World Income versus Global Population Note that while the income categories are determined by GNI, many other economic measures use GDP. (Source: World Bank, https://data.worldbank.org/indicator/NY.GDP.PCAP.CD)

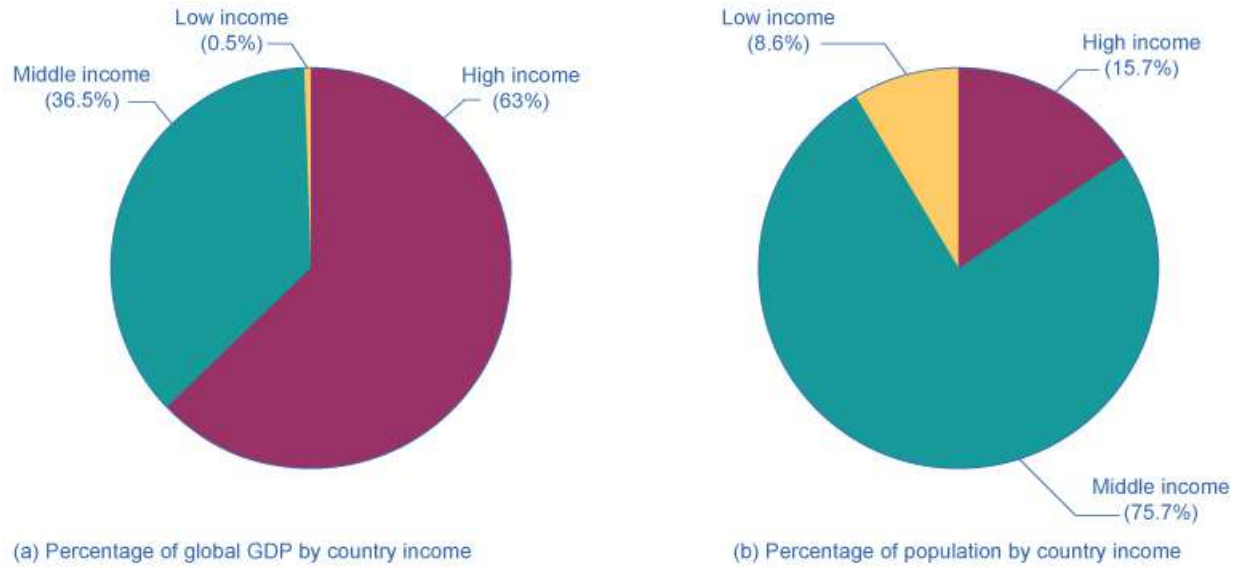


FIGURE 32.2 Percent of Global GDP and Percent of Population The two pie charts show that low-income countries represent less than 1% of global income and make up 8.6% of global population. The combined middle-income countries represent 36.5% of income and make up 75.7% of global population. And the high-income countries have 63% of the world's income and make up 15.7% of the population. (Source: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD)

An overview of the regional averages of GDP per person for developing countries, measured in comparable international dollars as well as population in 2018 (Figure 32.3), shows that the differences across these regions are stark. As Table 32.2 shows, nominal GDP per capita in 2020 for the 652 million people living in Latin America and the Caribbean region (excluding high income countries in that region) was $6,799, which far exceeds that of South Asia and sub-Saharan Africa. In turn, people in the world's high-income nations, such as those who live in the European Union nations or North America, have a per capita GDP three to four times that of the people of Latin America. To put things in perspective, North America and the European Union (plus the United Kingdom) have slightly more than 10% of the world's population, but they produce and consume about 44% of the world's GDP.

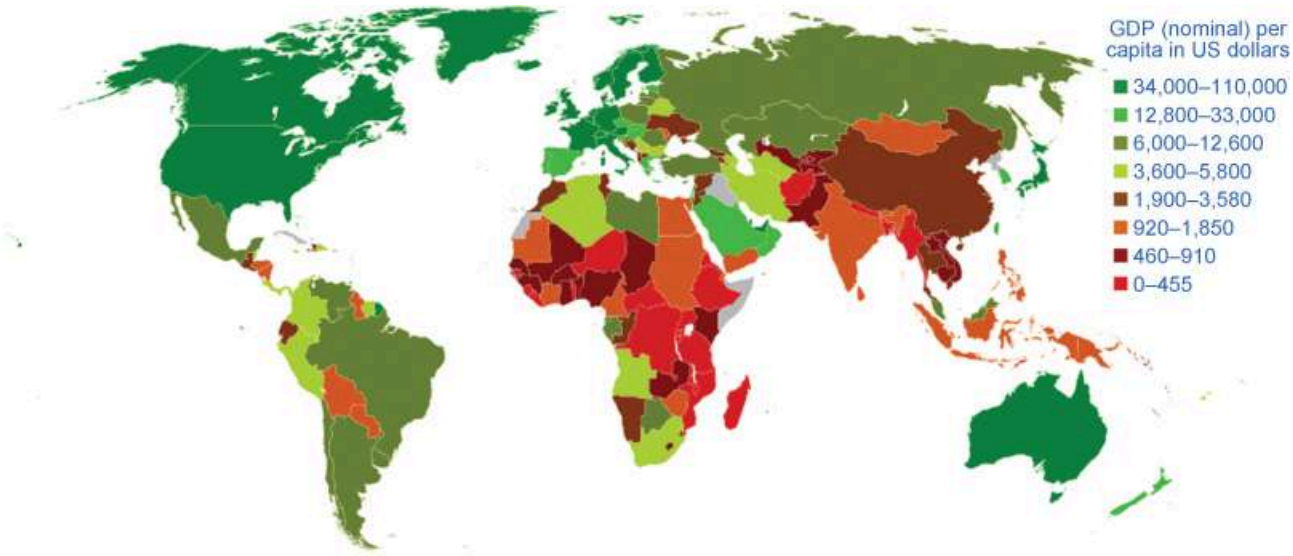


FIGURE 32.3 GDP Per Capita in U.S. Dollars There is a clear imbalance in the GDP across the world. North America, Australia, and Western Europe have the highest GDPs while large areas of the world have dramatically lower GDPs.

Russia and other former Soviet nations, as well as Argentina, Botswana, Brazil, Chile, Gabon, and Mexico, have a mid-tier per capita GDP of about $6,000–10,000. China, though a major economic engine for the world, is about $10,500. Egypt, India, Indonesia, Mongolia, and Sudan are lower at about $920–3,500. (Credit: modification of work by Bsrboy/Wikimedia Commons)

	Population (in millions)	GDP Per Capita
East Asia and Pacific	2,361	$8,254
South Asia	1,857	$1,823.7
Sub-Saharan Africa	1,136.7	$1,499.4
Latin America and Caribbean	652	$6,799.2
Middle East and North Africa	465	$3,018.4
Europe and Central Asia	923	$7,688.5

TABLE 32.2 Regional Comparisons of Nominal GDP per Capita and Population in 2020 GDP per capita excludes high income countries in each region. (Source: https://data.worldbank.org/indicator/NY.GDP.PCAP.CD)

Such comparisons between regions are admittedly rough. After all, per capita GDP cannot fully capture the quality of life. Many other factors have a large impact on the standard of living, like health, education, human rights, crime and personal safety, and environmental quality. These measures also reveal very wide differences in the standard of living across the regions of the world. Much of this is correlated with per capita income, but there are exceptions. For example, life expectancy at birth in many low-income regions approximates those who are more affluent. The data also illustrate that nobody can claim to have perfect standards of living. For instance, despite very high income levels, there is still undernourishment in Europe and North America.

LINK IT UP

Economists know that there are many factors that contribute to your standard of living. People in high-income countries may have very little time due to heavy workloads and may feel disconnected from their community. Lower-income countries may be more community centered, but have little in the way of material wealth. It is hard to measure these characteristics of standard of living. The Organization for Economic Co-Operation and Development has developed the "OECD Better Life Index." Visit this website (http://openstax.org/l/standofliving) to see how countries measure up to your expected standard of living.

The differences in economic statistics and other measures of well-being, substantial though they are, do not fully capture the reasons for the enormous differences between countries. Aside from the neoclassical determinants of growth, four additional determinants are significant in a wide range of statistical studies and are worth mentioning: geography, demography, industrial structure, and institutions.

Geographic and Demographic Differences

Countries have geographic differences: some have extensive coastlines, some are landlocked. Some have large rivers that have been a path of commerce for centuries, or mountains that have been a barrier to trade. Some have deserts, some have rain forests. These differences create different positive and negative opportunities for commerce, health, and the environment.

Countries also have considerable differences in the age distribution of the population. Many high-income

nations are approaching a situation by 2020 or so in which the elderly will form a much larger share of the population. Most low-income countries still have a higher proportion of youth and young adults, but by about 2050, the elderly populations in these low-income countries are expected to boom as well. These demographic changes will have considerable impact on the standard of living of the young and the old.

Differences in Industry Structure and Economic Institutions

Countries have differences in industry structure. In the world's high-income economies, only about 2% of GDP comes from agriculture; the average for the rest of the world is 12%. Countries have strong differences in degree of urbanization.

Countries also have strong differences in economic institutions: some nations have economies that are extremely market-oriented, while other nations have command economies. Some nations are open to international trade, while others use tariffs and import quotas to limit the impact of trade. Some nations are torn by long-standing armed conflicts; other nations are largely at peace. There are also differences in political, religious, and social institutions.

No nation intentionally aims for a low standard of living, high rates of unemployment and inflation, or an unsustainable trade imbalance. However, nations will differ in their priorities and in the situations in which they find themselves, and so their policy choices can reasonably vary, too. The next modules will discuss how nations around the world, from high income to low income, approach the four macroeconomic goals of economic growth, low unemployment, low inflation, and a sustainable balance of trade.

32.2 Improving Countries' Standards of Living

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Analyze the growth policies of low-income countries seeking to improve standards of living
- Analyze the growth policies of middle-income countries, particularly the East Asian Tigers with their focus on technology and market-oriented incentives
- Analyze the struggles facing economically-challenged countries wishing to enact growth policies
- Evaluate the success of sending aid to low-income countries

Jobs are created in economies that grow. What is the origin of economic growth? According to most economists who believe in the **growth consensus**, economic growth (as we discussed in Economic Growth) is built on a foundation of productivity improvements. In turn, productivity increases are the result of greater human and physical capital and technology, all interacting in a market-driven economy. In the pursuit of economic growth, however, some countries and regions start from different levels, as the differences in per capita GDP presented earlier in Table 32.2 illustrate.

Growth Policies for the High-Income Countries

For the high-income countries, the challenge of economic growth is to push continually for a more educated workforce that can create, invest in, and apply new technologies. In effect, the goal of their growth-oriented public policy is to shift their aggregate supply curves to the right (refer to The Aggregate Demand/Aggregate Supply Model). The main public policies targeted at achieving this goal are fiscal policies focused on investment, including investment in human capital, in technology, and in physical plant and equipment. These countries also recognize that economic growth works best in a stable and market-oriented economic climate. For this reason, they use monetary policy to keep inflation low and stable, and to minimize the risk of exchange rate fluctuations, while also encouraging domestic and international competition.

However, early in the second decade of the 2000s, many high-income countries found themselves more focused on the short term than on the long term. The United States, Western Europe, and Japan all experienced a combination of financial crisis and deep recession, and the after-effects of the recession—like high unemployment rates—seemed likely to linger for several years. Most of these governments took

aggressive, and in some cases controversial, steps to jump-start their economies by running very large budget deficits as part of expansionary fiscal policy. These countries must adopt a course that combines lower government spending and higher taxes.

Similarly, many central banks ran highly expansionary monetary policies, with both near-zero interest rates and unconventional loans and investments. For example, in 2012, Shinzo Abe (see Figure 32.4), then newly-elected Prime Minister of Japan, unveiled a plan to pull his country out of its two-decade-long slump in economic growth. It included both fiscal stimulus and an increase in the money supply. The plan was successful in some ways and unsuccessful in others. While real GDP growth in Japan has averaged around 1% since 2012 (and was only 0.2% in 2014 and 0.7% in 2016) and while the inflation rate has struggled to stay positive in recent years, the unemployment rate continued to decline through the 2010s. By early 2020, prior to the pandemic, the unemployment rate stood at just 2.5%. Public debt has also reached a plateau in the last 5–7 years of about 230–240% of GDP, although this number did increase slightly in 2020 due to the pandemic. Shinzo Abe stepped down as Prime Minister of Japan in 2020, and was assassinated in 2022.

FIGURE 32.4 Japan's Former Prime Minister, Shinzo Abe Japan used fiscal and monetary policies to stimulate its economy, which has helped bring down unemployment, but inflation remains stubbornly low. (Credit: modification of "Shinzo Abe, Prime Minister of Japan" by Chatham House/Flickr Creative Commons, CC BY 2.0)

As we discussed in other chapters, macroeconomics needs to have both a short-run and a long-run focus. The challenge for many of the developed countries in the next few years will be to grapple with the consequences of the pandemic. With high unemployment and no end of the virus containment in sight, it will be challenging for these governments to refocus their efforts on new technology, education, and physical capital investment.

Growth Policies for the Middle-Income Economies

The world's great economic success stories in the last few decades began in the 1970s with that group of nations sometimes known as the **East Asian Tigers**: South Korea, Thailand, Malaysia, Indonesia, and Singapore. The list sometimes includes Hong Kong and Taiwan, although often under international law they are treated as part of China, rather than as separate countries. The economic growth of the Tigers has been phenomenal, typically averaging 5.5% real per capita growth for several decades. In the 1980s, other countries began to show signs of convergence. China began growing rapidly, often at annual rates of 8% to 10% per year. India began growing rapidly, first at rates of about 5% per year in the 1990s, but then higher still in the first decade of the 2000s.

We know the underlying causes of these rapid growth rates:

- China and the East Asian Tigers, in particular, have been among the highest savers in the world, often saving one-third or more of GDP as compared to the roughly one-fifth of GDP, which would be a more typical saving rate in Latin America and Africa. These countries harnessed higher savings for domestic investment to build physical capital.
- These countries had policies that supported heavy investments in human capital, first building up primary-level education and then expanding secondary-level education. Many focused on encouraging math and science education, which is useful in engineering and business.
- Governments made a concerted effort to seek out applicable technology, by sending students and

government commissions abroad to look at the most efficient industrial operations elsewhere. They also created policies to support innovative companies that wished to build production facilities to take advantage of the abundant and inexpensive human capital.
- China and India in particular also allowed far greater freedom for market forces, both within their own domestic economies and also in encouraging their firms to participate in world markets.

This combination of technology, human capital, and physical capital, combined with the incentives of a market-oriented economic context, proved an extremely powerful stimulant to growth. Challenges that these middle-income countries faced are a legacy of government economic controls that for political reasons can be dismantled only slowly over time. In many of them, the government heavily regulates the banking and financial sector. Governments have also sometimes selected certain industries to receive low-interest loans or government subsidies. These economies have found that an increased dose of market-oriented incentives for firms and workers has been a critical ingredient in the recipe for faster growth. To learn more about measuring economic growth, read the following Clear It Up feature.

CLEAR IT UP

What is the rule of 72?

It is worth pausing a moment to marvel at the East Asian Tigers' growth rates. If per capita GDP grows at, say, 6% per year, then you can apply the formula for compound growth rates—that is $(1 + 0.06)^{30}$—meaning a nation's level of per capita GDP will rise by a multiple of almost six over 30 years. Another strategy is to apply the rule of 72. The rule of 72 is an approximation to figure out doubling time. We divide the rule number, 72, by the annual growth rate to obtain the approximate number of years it will take for income to double. If we have a 6% growth rate, it will take 72/6, or 12 years, for incomes to double. Using this rule here suggests that a Tiger that grows at 6% will double its GDP every 12 years. In contrast, a technological leader, chugging along with per capita growth rates of about 2% per year, would double its income in 36 years.

Growth Policies for Economically-Challenged Countries

Many economically-challenged or low-income countries are geographically located in Sub-Saharan Africa. Other pockets of low income are in the former Soviet Bloc, and in parts of Central America and the Caribbean.

There are macroeconomic policies and prescriptions that might alleviate the extreme poverty and low standard of living. However, many of these countries lack the economic and legal stability, along with market-oriented institutions, needed to provide a fertile climate for domestic economic growth and to attract foreign investment. Thus, macroeconomic policies for low income economies are vastly different from those of the high income economies. The World Bank has made it a priority to combat poverty and raise overall income levels through 2030. One of the key obstacles to achieving this is the political instability that seems to be a common feature of low-income countries.

Figure 32.5 shows the ten lowest income countries as ranked by The World Bank in 2020. These countries share some common traits, the most significant of which is the recent failures of their governments to provide a legal framework for economic growth. Civil and ethnic wars have impacted Burundi. Command economies, corruption, as well as political factionalism and infighting are commonly adopted elements in these low-income countries. The Democratic Republic of the Congo (often referred to as "Congo") is a resource-wealthy country that has not been able to increase its subsistence standard of living due to the political environment.

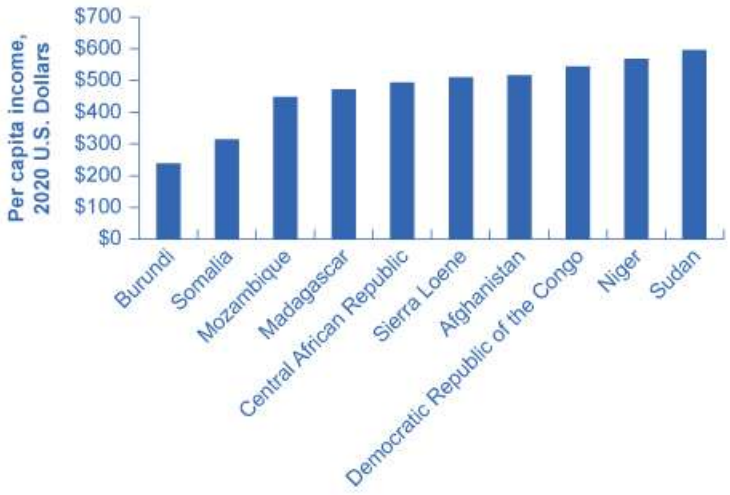


FIGURE 32.5 The Ten Lowest Income Countries This bar chart that shows the ten lowest-income countries by per capita income. They are, from lowest income to highest: Burundi, Somalia, Mozambique, Madagascar, Central African Republic, Sierra Leone, Afghanistan, Democratic Republic of Congo, Niger, and Sudan. (Source: http://databank.worldbank.org/data/views/reports/map.aspx#)

Low-income countries are at a disadvantage because any incomes that people receive are spent immediately on necessities such as food. People in these countries live on less than $1,035 per year, which is less than $100 per month. Lack of saving means a lack of capital accumulation and a lack of loanable funds for investment in physical and human capital. Recent research by two MIT economists, Abhijit Bannerjee and Esther Duflo, has confirmed that the households in these economies are trapped in low incomes because they cannot muster enough investment to push themselves out of poverty.

For example, the average citizen of Burundi, a low-income country, subsists on $239 per year (adjusted to 2020 dollars). According to Central Intelligence Agency data in its CIA Factbook, as of 2021, 85% of Burundi's population is agrarian, with bananas as the main income producing crop. Only one in two children attends school and, as Figure 32.6 shows, many are not in schools comparable to what occurs in developed countries. Political instability has made it difficult for Burundi to make significant headway toward growth, as verified by the electrification of only 11% of households and 40% of its national income coming from foreign aid.

FIGURE 32.6 Lack of Funds for Investing in Human Capital In low-income countries, people often spend all income on necessities for living and cannot accumulate or invest in physical or human capital. The students in this photograph learn in an outside "classroom" void of not only technology, but even chairs and desks. (Credit: "Living in Kuito" by Rafaela Printes/Flickr Creative Commons, CC BY 2.0)

LINK IT UP

The World Factbook website (http://openstax.org/l/worldfactbook) is loaded with maps, flags, and other information about countries across the globe.

Other low-income countries share similar stories. These countries have found it difficult to generate investments for themselves or to find foreign investors willing to put up the money for more than the basic needs. Foreign aid and external investment comprise significant portions of the income in these economies, but are not sufficient to allow for the capital accumulation necessary to invest in physical and human capital. However, is foreign aid always a contributor to economic growth?

Development economics is a branch of economics that often focuses on answering that question and others like it. Development economists analyze the forces and outcomes of economics in developing nations. The field is typically focused on—and sometimes defined as—understanding and implementing policies and practices to improve economic and social wellbeing in low- and middle-income nations or regions. But it is an extremely wide and varied area of study, often blending politics, fiscal policy, education, innovation, health and medicine, international trade, natural resources, and military/geopolitical considerations.

Many development economists have focused on understanding the best mix of approaches to foster equitable and sustainable growth. Like other economists, they may analyze practices or outcomes from the past and apply that knowledge to the present and future. And many prominent development economists challenge traditional ways of thinking. Dambisa Moyo, for example, provides evidence indicating that foreign aid is rarely a positive solution and often does more harm than good. In her book *Dead Aid: Why Aid Is Not Working and How There Is Another Way for Africa* (2009), she lays out the failure of past aid, indicating that it typically ends up in the pockets of corrupt officials and has the adverse effect of minimizing other types of investment. At the time, Moyo proposed a complete stoppage of foreign aid into Africa. Moyo sees far greater promise in increases in trade and direct private investment, as well as other financing options such as bonds.

CLEAR IT UP

Does foreign aid to low-income countries work?

According to the Organization of Economic Cooperation and Development (OECD), about $134 billion per year in foreign aid flows from the high-income countries of the world to the low-income ones. Relative to the size of their populations or economies, this is not a large amount for either donors or recipients. For low-income countries, aid averages about 1.3 percent of their GDP. However, even this relatively small amount has been highly controversial.

Supporters of additional foreign aid point to the extraordinary human suffering in the world's low-and middle-income countries. They see opportunities all across Africa, Asia, and Latin America to set up health clinics and schools. They want to help with the task of building economic infrastructure: clean water, plumbing, electricity, and roads. Supporters of this aid include formal state-sponsored institutions like the United Kingdom's Department for International Development (DFID) or independent non-governmental organizations (NGOs) like CARE International that also receive donor government funds. For example, because of an outbreak of meningitis in Ethiopia in 2010, DFID channeled significant funds to the Ethiopian Ministry of Health to train rural health care workers and also for vaccines. These monies helped the Ministry offset shortfalls in their budget.

Opponents of increased aid do not quarrel with the goal of reducing human suffering, but they suggest that foreign aid has often proved a poor tool for advancing that goal. For example, according to an article in the *Attaché Journal of International Affairs*, the Canadian foreign aid organization (CIDA) provided $100 million to Tanzania to grow wheat. The project did produce wheat, but nomadic pastoralists and other villagers who had lived on the land were driven off 100,000 acres of land to make way for the project. The damage in terms of human rights and lost livelihoods was significant. Villagers were beaten and killed because some refused to leave the land. At times, the

unintended collateral damage from foreign aid can be significant.

William Easterly, professor of economics at New York University, argues that countries often receive aid for political reasons and the aid does more harm than good. If a country's government creates a reasonably stable and market-oriented macroeconomic climate, then foreign investors will be likely to provide funds for many profitable activities. For example, Facebook partnered with multiple organizations in a project called Internet.org to provide access in remote and low-income areas of the world, and Google began its own initiative called Project Loon in 2011, although it was phased out in 2021. Facebook's first forays into providing internet access via mobile phones began in stable, market-oriented countries like India, Brazil, Indonesia, Turkey, and the Philippines and continues its work in Africa by working with telecommunications corporations in China to develop an undersea cable network.

Policymakers are now wiser about foreign aid limitations than they were a few decades ago. In targeted and specific cases, especially if foreign aid is channeled to long-term investment projects, foreign aid can have a modest role to play in reducing the extreme levels of deprivation that hundreds of millions of people around the world experience.

LINK IT UP

Watch this video (http://openstax.org/l/foodafrica) on the complexities of providing economic aid in Africa.

32.3 Causes of Unemployment around the World

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Explain the nature and causes of unemployment
- Analyze the natural rate of unemployment and the factors that affect it
- Identify how undeveloped labor markets can result in the same hardships as unemployment

We can categorize the causes of unemployment in the world's high-income countries in two ways: either cyclical unemployment caused by the economy when in a recession, or the natural rate of unemployment caused by factors in labor markets, such as government regulations regarding hiring and starting businesses.

Unemployment from a Recession

For unemployment caused by a recession, the Keynesian economic model points out that both monetary and fiscal policy tools are available. The monetary policy prescription for dealing with recession is straightforward: run an expansionary monetary policy to increase the quantity of money and loans, drive down interest rates, and increase aggregate demand. In a recession, there is usually relatively little danger of inflation taking off, and so even a central bank, with fighting inflation as its top priority, can usually justify some reduction in interest rates.

With regard to fiscal policy, the automatic stabilizers that we discussed in Government Budgets and Fiscal Policy should be allowed to work, even if this means larger budget deficits in times of recession. There is less agreement over whether, in addition to automatic stabilizers, governments in a recession should try to adopt discretionary fiscal policy of additional tax cuts or spending increases. In the case of the Great Recession, the case for this kind of extra-aggressive expansionary fiscal policy is stronger, but for a smaller recession, given the time lags of implementing fiscal policy, countries should use discretionary fiscal policy with caution.

However, the aftermath of the Recession emphasizes that expansionary fiscal and monetary policies do not turn off a recession like flipping a switch turns off a lamp. Even after a recession is officially over, and positive growth has returned, it can take some months—or even a couple of years—before private-sector firms believe the economic climate is healthy enough that they can expand their workforce.

The Natural Rate of Unemployment

Unemployment rates in European nations have typically been higher than in the United States. In 2020, before the start of the COVID-19 pandemic, the U.S. unemployment rate was 3.5%, compared with 8.5% in France, 10% in Italy, and 7.1% in Sweden. We can attribute the pattern of generally higher unemployment rates in Europe, which dates back to the 1970s, to the fact that European economies have a higher natural rate of unemployment because they have a greater number of rules and restrictions that discourage firms from hiring and unemployed workers from taking jobs.

Addressing the natural rate of unemployment is straightforward in theory but difficult in practice. Government can play a useful role in providing unemployment and welfare payments, for example, by passing rules about where and when businesses can operate, and assuring that the workplace is safe. However, these well-intentioned laws can, in some cases, become so intrusive that businesses decide to place limits on their hiring.

For example, a law that imposes large costs on a business that tries to fire or lay off workers will mean that businesses try to avoid hiring in the first place, as is the case in France. According to *Business Week*, "France has 2.4 times as many companies with 49 employees as with 50 … according to the French labor code, once a company has at least 50 employees inside France, management must create three worker councils, introduce profit sharing, and submit restructuring plans to the councils if the company decides to fire workers for economic reasons." This labor law essentially limits employment (or raises the natural rate of unemployment).

Undeveloped and Transitioning Labor Markets

Low-income and middle-income countries face employment issues that go beyond unemployment as it is understood in the high-income economies. A substantial number of workers in these economies provide many of their own needs by farming, fishing, or hunting. They barter and trade with others and may take a succession of short-term or one-day jobs, sometimes receiving pay with food or shelter, sometimes with money. They are not "unemployed" in the sense that we use the term in the United States and Europe, but neither are they employed in a regular wage-paying job.

The starting point of economic activity, as we discussed in Welcome to Economics!, is the division of labor, in which workers specialize in certain tasks and trade the fruits of their labor with others. Workers who are not connected to a labor market are often unable to specialize very much. Because these workers are not "officially" employed, they are often not eligible for social benefits like unemployment insurance or old-age payments—if such payments are even available in their country. Helping these workers to become more connected to the labor market and the economy is an important policy goal. Recent research by development economists suggests that one of the key factors in raising people in low-income countries out of the worst kind of poverty is whether they can make a connection to a somewhat regular wage-paying job.

Economist Sir W. Arthur Lewis examined such transitions of labor and the impact on economic development. His core theoretical framework—the dual sector economy—proposes that, essentially, the marginal product of low-skilled workers is greater in the manufacturing sector than it is in the agricultural sector. That's because most agricultural societies are both mature and have fixed inputs (land, water, and related resources); the marginal product of additional farmers on that land is nearly zero, creating what Lewis termed "surplus workers." Early-stage manufacturing sectors, however, have great need for low-skilled workers, and can make better use (greater marginal product) of them. Their wages will remain low, but as stated above, the wages are more likely to be consistent and therefore move toward a large-scale transition of the labor force.

We have seen this practically in many nations experiencing a shift in labor, particularly in China. In many regions, it is marked by a level of migration—people leaving rural areas for cities or manufacturing zones. At some point, nations achieve what economists call the Lewis turning point, in which the surplus agricultural labor is fully absorbed into the manufacturing sector. Typically, when this occurs, wages in both agricultural and manufacturing sectors begin to rise in a sustainable manner. Despite massive transformation in the Chinese economy over the past decades, economists dispute whether China has actually reached the Lewis

turning point.

Economic transition is not without its downsides. Many manufacturing-focused countries still rely heavily on their agricultural sectors for their own sustenance and as a core part of international trade. As the agricultural sector faces competition from manufacturing, and as people physically leave rural areas, farming economies can suffer downturns and unpredictability. Finally, countries or individual farmers seeking to make up for their missing labor may encourage migration and/or immigration that may cause political or financial conflict.

32.4 Causes of Inflation in Various Countries and Regions

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Identify the causes and effects of inflation in various economic markets
- Explain the significance of a converging economy

Policymakers of the high-income economies appear to have learned some lessons about fighting inflation. First, whatever happens with aggregate supply and aggregate demand in the short run, countries can use monetary policy to prevent inflation from becoming entrenched in the economy in the medium and long term. Second, there is no long-run gain to letting inflation become established. In fact, allowing inflation to become lasting and persistent poses undesirable risks and tradeoffs. When inflation is high, businesses and individuals need to spend time and effort worrying about protecting themselves against inflation, rather than seeking better ways to serve customers. In short, the high-income economies appear to have both a political consensus to hold inflation low and the economic tools to do so. Despite this, periods of growing inflation can stagnate economic growth and lead to significant political consequences for leaders. In 2022, the U.S. inflation rate reached 9.1%, an unexpected peak that the country hadn't seen since 1981. As is often the case, President Joe Biden was held politically responsible, and negotiated with Congress to pass a massive economic and climate bill titled the Inflation Reduction Act.

In a number of middle- and low-income economies around the world, inflation is far from a solved problem. In the early 2000s, Turkey experienced inflation of more than 50% per year for several years and continues to experience high inflation today. Belarus had inflation of about 100% per year from 2000 to 2001. From 2008 to 2010, Venezuela and Myanmar had inflation rates of 20% to 30% per year. Indonesia, Iran, Nigeria, the Russian Federation, and Ukraine all had double-digit inflation for most of the years from 2000 to 2010. Zimbabwe had hyperinflation, with inflation rates that went from more than 100% per year in the mid-2000s to a rate of several million percent in 2008.

In these countries, the problem of very high inflation generally arises from huge budget deficits, which the government finances by printing its domestic currency. This is a case of “too much money chasing too few goods.” In the case of Venezuela, beginning in 2016 the government covered its widening deficits by printing ever higher currency notes, with inflation reaching 1,000,000% by 2018. The crisis continues today, with high rates of inflation and high unemployment (over 40%). There is some discussion of dollarization, or a conversion from Venezuelan bolivars to U.S. dollars as the main currency, as a solution to the hyperinflation. Even in 2019, over 50% of transactions in Venezuela were reportedly using U.S. dollars, and banks issued debit cards denominated in U.S. dollars in 2021.

A number of countries have managed to sustain solid levels of economic growth for sustained periods of time with inflation levels that would sound high by recent U.S. standards, like 10% to 30% per year. In such economies, the governments index most contracts, wage levels, and interest rates to inflation. Indexing wage contracts and interest rates means that they will increase when inflation increases to retain purchasing power. When wages do not rise as price levels rise, this leads to a decline in the real wage rate and a decrease in the standard of living. Likewise, interest rates that are not indexed mean that money lenders will receive payment in devalued currency and will also lose purchasing power on monies that they lent. It is clearly possible—and perhaps sometimes necessary—for a **converging economy** (the economy of a country that demonstrates the

ability to catch up to the technology leaders) to live with a degree of uncertainty over inflation that would be politically unacceptable in the high-income economies.

32.5 Balance of Trade Concerns

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Explain the meaning of trade balance and its implications for the foreign exchange market
- Analyze concerns over international trade in goods and services and international flows of capital
- Identify and evaluate market-oriented economic reforms

In the 1950s and 1960s, and even into the 1970s, low- and middle-income countries often viewed openness to global flows of goods, services, and financial capital in a negative light. These countries feared that foreign trade would mean both economic losses as high-income trading partners "exploited" their economy and they lost domestic political control to powerful business interests and multinational corporations.

These negative feelings about international trade have evolved. After all, the great economic success stories of recent years like Japan, the East Asian Tiger economies, China, and India, all took advantage of opportunities to sell in global markets. European economies thrive with high levels of trade. In the North American Free Trade Agreement (NAFTA), [1] the United States, Canada, and Mexico pledged themselves to reduce trade barriers. Many countries have clearly learned that reducing barriers to trade is at least potentially beneficial to the economy. Many smaller world economies have learned an even tougher lesson: if they do not participate actively in world trade, they are unlikely to join the success stories among the converging economies. There are no examples in world history of small economies that remained apart from the global economy but still attained a high standard of living.

Although almost every country now claims that its goal is to participate in global trade, the possible negative consequences have remained highly controversial. It is useful to divide these possible negative consequences into issues involving trade of goods and services and issues involving international capital flows. These issues are related, but not the same. An economy may have a high level of trade in goods and services relative to GDP, but if exports and imports are balanced, the net flow of foreign investment in and out of the economy will be zero. Conversely, an economy may have only a moderate level of trade relative to GDP, but find that it has a substantial current account trade imbalance. Thus, it is useful to consider the concerns over international trade of goods and services and international flows of financial capital separately.

Concerns over International Trade in Goods and Services

There is a long list of worries about foreign trade in goods and services: fear of job loss, environmental dangers, unfair labor practices, and many other concerns. We discuss these arguments at some length in the chapter on The International Trade and Capital Flows.

Of all of the arguments for limitations on trade, perhaps the most controversial one among economists is the infant industry argument; that is, subsidizing or protecting new industries for a time until they become established. (Globalization and Protectionism explains this concept in more detail.) Countries have used such policies with some success at certain points in time, but in the world as a whole, support for key industries is far more often directed at long-established industries with substantial political power that are suffering losses and laying off workers, rather than potentially vibrant new industries that are not yet established. If government intends to favor certain industries, it needs to do so in a way that is temporary and that orients them toward a future of market competition, rather than a future of unending government subsidies and trade protection.

1 As of July 1, 2020, NAFTA was officially replaced with the United States-Mexico-Canada (USMCA) free trade agreement. It is broadly similar to the original NAFTA.

Concerns over International Flows of Capital

Recall from The Macroeconomic Perspective that a trade deficit exists when a nation's imports exceed its exports. In order for a trade deficit to take place, foreign countries must provide loans or investments, which they are willing to do because they expect eventual repayment (that the deficit will become a surplus). A trade surplus, you may remember, exists when a nation's exports exceed its imports. Thus, in order for a trade deficit to switch to a trade surplus, a nation's exports must rise and its imports must fall. Sometimes this happens when the currency decreases in value. For example, if the U.S. had a trade deficit and the dollar depreciated, imports would become more expensive. This would, in turn, benefit the foreign countries that provided the loans or investments.

The expected pattern of trade imbalances in the world economy has been that high-income economies will run trade surpluses, which means they will experience a net outflow of capital to foreign destinations or export more than they import, while low- and middle-income economies will run trade deficits, which means that they will experience a net inflow of foreign capital.

This international investing pattern can benefit all sides. Investors in the high-income countries benefit because they can receive high returns on their investments, and also because they can diversify their investments so that they are at less risk of a downturn in their own domestic economy. The low-income economies that receive an inflow of capital presumably have potential for rapid catch-up economic growth, and they can use the international financial capital inflow to help spur their physical capital investment. In addition, financial capital inflows often come with management abilities, technological expertise, and training.

However, for the last couple of decades, this cheerful scenario has faced two "dark clouds." The first cloud is the very large trade or current account deficits in the U.S. economy. (See The International Trade and Capital Flows.) Instead of offering net financial investment abroad, the U.S. economy is soaking up savings from all over the world. These substantial U.S. trade deficits may not be sustainable according to Sebastian Edwards writing for the National Bureau of Economic Research. While trade deficits on their own are not bad, the question is whether governments will reduce them gradually or hastily. In the gradual scenario, U.S. exports could grow more rapidly than imports over a period of years, aided by U.S. dollar depreciation. An unintended consequence of the slow growth since the Great Recession has been a decline in the U.S. current account deficit's from 6% pre-recession to 3% most recently.

The other option is that the government could reduce the U.S. trade deficit in a rush. Here is one scenario: if foreign investors became less willing to hold U.S. dollar assets, the dollar exchange rate could weaken. As speculators see this process happening, they might rush to unload their dollar assets, which would drive the dollar down still further.

A lower U.S. dollar would stimulate aggregate demand by making exports cheaper and imports more expensive. It would mean higher prices for imported inputs throughout the economy, shifting the short-term aggregate supply curve to the left. The result could be a burst of inflation and, if the Federal Reserve were to run a tight monetary policy to reduce the inflation, it could also lead to recession. People sometimes talk as if the U.S. economy, with its great size, is invulnerable to this sort of pressure from international markets. While it is difficult to rock, it is not impossible for the $17 trillion U.S. economy to face these international pressures.

The second "dark cloud" is how the smaller world economies should deal with the possibility of sudden foreign financial capital inflows and outflows. Perhaps the most vivid recent example of the potentially destructive forces of international capital movements occurred in the East Asian Tiger economies in 1997–1998. Thanks to their excellent growth performance over the previous few decades, these economies had attracted considerable interest from foreign investors. In the mid-1990s, however, foreign investment into these countries surged even further. Much of this money funneled through banks that borrowed in U.S. dollars and loaned in their national currencies. Bank lending surged at rates of 20% per year or more. This inflow of foreign capital meant that investment in these economies exceeded the level of domestic savings, so that

current account deficits in these countries jumped into the 5–10% GDP range.

The surge in bank lending meant that many banks in these East Asian countries did not do an especially good job of screening out safe and unsafe borrowers. Many of the loans—as high as 10% to 15% of all loans in some of these countries—started to turn bad. Fearing losses, foreign investors started pulling out their money. As the foreign money left, the exchange rates of these countries crashed, often falling by 50% or more in a few months. The banks were stuck with a mismatch: even if the rest of their domestic loans were repaid, they could never pay back the U.S. dollars that they owed. The banking sector as a whole went bankrupt. The lack of credit and lending in the economy collapsed aggregate demand, bringing on a deep recession.

If the flow and ebb of international capital markets can flip even the economies of the East Asian Tigers, with their stellar growth records, into a recession, then it is no wonder that other middle- and low-income countries around the world are concerned. Moreover, similar episodes of an inflow and then an outflow of foreign financial capital have rocked a number of economies around the world: for example, in the last few years, economies like Ireland, Iceland, and Greece have all experienced severe shocks when foreign lenders decided to stop extending funds. Especially in Greece, this caused the government to enact austerity measures which led to protests throughout the country (Figure 32.7).

FIGURE 32.7 Protests in Greece The economic conditions in Greece have deteriorated from the Great Recession such that the government had to enact austerity measures, (strict rules) cutting wages and increasing taxes on its population. Massive protests are but one byproduct. (Credit: modification of work by Apostolos/Flickr Creative Commons)

Many nations are taking steps to reduce the risk that their economy will be injured if foreign financial capital takes flight, including having their central banks hold large reserves of foreign exchange and stepping up their regulation of domestic banks to avoid a wave of imprudent lending. The most controversial steps in this area involve whether countries should try to take steps to control or reduce the flows of foreign capital. If a country could discourage some speculative short-term capital inflow, and instead only encourage investment capital that it committed for the medium and the long term, then it could be at least somewhat less susceptible to swings in the sentiments of global investors.

If economies participate in the global trade of goods and services, they will also need to participate in international flows of financial payments and investments. These linkages can offer great benefits to an economy. However, any nation that is experiencing a substantial and sustained pattern of trade deficits, along with the corresponding net inflow of international financial capital, has some reason for concern. During the Asian Financial Crisis in the late 1990s, countries that grew dramatically in the years leading up to the crisis as international capital flowed in, saw their economies collapse when the capital very quickly flowed out.

Market-Oriented Economic Reforms

The standard of living has increased dramatically for billions of people around the world in the last half century. Such increases have occurred not only in the technological leaders like the United States, Canada, the nations of Europe, and Japan, but also in the East Asian Tigers and in many nations of Latin America and Eastern Europe. The challenge for most of these countries is to maintain these growth rates. The economically-challenged regions of the world have stagnated and become stuck in poverty traps. These countries need to focus on the basics: health and education, or human capital development. As Figure 32.8 illustrates, modern technology allows for the investment in education and human capital development in ways that would have not been possible just a few short years ago.

FIGURE 32.8 Solar-powered Technology Modern technologies, such as solar-power and Wi-Fi, enable students to obtain education even in remote parts of a country without electricity. These students in Ghana are sharing a laptop provided by a van with solar-power. (Credit: "Hands on computer class - children in Ho, Volta Region, Ghana" by EIFL/Flickr Creative Commons, CC BY 2.0)

Other than the issue of economic growth, the other three main goals of macroeconomic policy—that is, low unemployment, low inflation, and a sustainable balance of trade—all involve situations in which, for some reason, the economy fails to coordinate the forces of supply and demand. In the case of cyclical unemployment, for example, the intersection of aggregate supply and aggregate demand occurs at a level of output below potential GDP. In the case of the natural rate of unemployment, government regulations create a situation where otherwise-willing employers become unwilling to hire otherwise-willing workers. Inflation is a situation in which aggregate demand outstrips aggregate supply, at least for a time, so that too much buying power is chasing too few goods. A trade imbalance is a situation where, because of a net inflow or outflow of foreign capital, domestic savings are not aligned with domestic investment. Each of these situations can create a range of easier or harder policy choices.

BRING IT HOME

Youth Unemployment

Spain and South Africa had the same high youth unemployment in 2020, but the reasons for this unemployment are different. Spain's current account balance is negative, which means it is borrowing heavily. To cure cyclical unemployment during a recession, the Keynesian model suggests increases in government spending—fiscal expansion or monetary expansion. Neither option is open to Spain. It currently can borrow at only high interest rates, which will be a real problem in terms of debt service. In addition, the rest of the European Union (EU) has dragged its feet when it comes to debt forgiveness. Monetary expansion is not possible because Spain uses the euro and cannot devalue its currency unless it convinces all of the EU to do so. What can be done? The *Economist*,

summarizing some ideas of economists and policymakers, suggests that Spain's only realistic (although painful) option is to reduce government-mandated wages, which would allow it to reduce government spending. As a result, the government would be able to lower tax rates on the working population. With a lower wage or lower tax environment, firms will hire more workers. This will lower unemployment and stimulate the economy. Spain can also encourage greater foreign investment and try to promote policies that encourage domestic savings.

South Africa has more of a natural rate of unemployment problem. It is an interesting case because its youth unemployment is mostly because its young are not ready to work. Economists commonly refer to this as an employability problem. According to interviews of South African firms as reported in the *Economist*, the young are academically smart but lack practical skills for the workplace. Despite a big push to increase investment in human capital, the results have not yet borne fruit. Recently the government unveiled a plan to pay unemployed youth while they were "trained-up" or apprenticed in South African firms. The government has room to increase fiscal expenditure, encourage domestic savings, and continue to fund investment in education, vocational training, and apprentice programs. South Africa can also improve the climate for foreign investment from technology leaders, which would encourage economic growth.

India has a smaller youth employment problem in terms of percentages. However, bear in mind that since this is a populous country, it turns out to be a significant problem in raw numbers. According to Kaushik Basu, writing for the BBC, "there are 45 national laws governing the hiring and firing decisions of firms and close to four times that amount at the state level". These laws make it difficult for companies to fire workers. To stay nimble and responsive to markets, Indian companies respond to these laws by hiring fewer workers. The Indian government can do much to solve this problem by adjusting its labor laws. Essentially, the government has to remove itself from firms' hiring and firing decisions, so that growing Indian firms can freely employ more workers. Indian workers, like those in South Africa, do not have workforce skills. Again, the government can increase its spending on education, vocational training, and workforce readiness programs.

Finally, India has a significant current account deficit. This deficit is mainly a result of short- and long-term capital flows. To solve this deficit, India has experimented by lifting the limitation on domestic savers from investing abroad. This is a step in the right direction that may dampen the growth in the current account deficit. A final policy possibility is to improve domestic capital markets so many self-employed Indians can obtain access to capital to realize their business ideas. If more Indians can obtain access to capital to start businesses, employment might increase.

Key Terms

converging economy economy of a country that has demonstrated the ability to catch up to the technology leaders by investing in both physical and human capital

East Asian Tigers the economies of Taiwan, Singapore, Hong Kong, and South Korea, which maintained high growth rates and rapid export-led industrialization between the early 1960s and 1990 allowing them to converge with the technological leaders in high-income countries

growth consensus a series of studies that show, statistically, that 70% of the differences in income per person across the world is explained by differences in physical capital (savings/investment)

high-income country nation with a per capita income of $12,475 or more; typically has high levels of human and physical capital

low-income country a nation that has a per capita income of less than $1,025; a third of the world's population

middle-income country a nation with per capita income between $1,025 and $12, 475 and that has shown some ability, even if not always sustained, to catch up to the technology leaders in high-income countries

Key Concepts and Summary

32.1 The Diversity of Countries and Economies across the World

Macroeconomic policy goals for most countries strive toward low levels of unemployment and inflation, as well as stable trade balances. Economists analyze countries based on their GDP per person and ranked as low-, middle-, and high-income countries. Low-income are those earning less than $1,025 (less than 1%) of global income. They currently have 18.5% of the world population. Middle-income countries are those with per capital income of $1,025–$12,475 (31.1% of global income). They have 69.5% of world population. High-income countries are those with per capita income greater than $12,475 (68.3% of global income). They have 12% of the world's population. Regional comparisons tend to be inaccurate because even countries within those regions tend to differ from each other.

32.2 Improving Countries' Standards of Living

The fundamentals of growth are the same in every country: improvements in human capital, physical capital, and technology interacting in a market-oriented economy. Countries that are high-income tend to focus on developing and using new technology. Countries that are middle-income focus on increasing human capital and becoming more connected to technology and global markets. They have charted unconventional paths by relying more on state-led support rather than relying solely on markets. Low-income, economically-challenged countries have many health and human development needs, but they are also challenged by the lack of investment and foreign aid to develop infrastructure like roads. There are some bright spots when it comes to financial development and mobile communications, which suggest that low-income countries can become technology leaders in their own right, but it is too early to claim victory. These countries must do more to connect to the rest of the global economy and find the technologies that work best for them.

32.3 Causes of Unemployment around the World

We can address cyclical unemployment by expansionary fiscal and monetary policy. The natural rate of unemployment can be harder to solve, because it involves thinking carefully about the tradeoffs involved in laws that affect employment and hiring. Unemployment is understood differently in high-income countries compared to low- and middle-income countries. People in these countries are not "unemployed" in the sense that we use the term in the United States and Europe, but neither are they employed in a regular wage-paying job. While some may have regular wage-paying jobs, others are part of a barter economy.

32.4 Causes of Inflation in Various Countries and Regions

Most high-income economies have learned that their central banks can control inflation in the medium and the long term. In addition, they have learned that inflation has no long-term benefits but potentially

substantial long-term costs if it distracts businesses from focusing on real productivity gains. However, smaller economies around the world may face more volatile inflation because their smaller economies can be unsettled by international movements of capital and goods.

32.5 Balance of Trade Concerns

There are many legitimate concerns over possible negative consequences of free trade. Perhaps the single strongest response to these concerns is that there are good ways to address them without restricting trade and thus losing its benefits. There are two major issues involving trade imbalances. One is what will happen with the large U.S. trade deficits, and whether they will come down gradually or with a rush. The other is whether smaller countries around the world should take some steps to limit flows of international capital, in the hope that they will not be quite so susceptible to economic whiplash from international financial capital flowing in and out of their economies.

Self-Check Questions

1. Using the data in Table 32.3, rank the seven regions of the world according to GDP and then according to GDP per capita.

	Population (in millions)	GDP Per Capita	GDP = Population × Per Capita GDP (in millions)
East Asia and Pacific	2,006	$5,536	$10,450,032
South Asia	1,671	$1,482	$2,288,812
Sub-Saharan Africa	936.1	$1,657	$1,287,650
Latin America and Caribbean	588	$9,536	$5,339,390
Middle East and North Africa	345.4	$3,456	$1,541,900
Europe and Central Asia	272.2	$7,118	$1,862,384

TABLE 32.3 GDP and Population of Seven Regions of the World

2. What are the drawbacks to analyzing the global economy on a regional basis?
3. Create a table that identifies the macroeconomic policies for a high-income country, a middle-income country, and a low-income country.
4. Use the data in the text to contrast the policy prescriptions of the high-income, middle-income, and low-income countries.
5. What are the different policy tools for dealing with cyclical unemployment?
6. Explain how the natural rate of unemployment may be higher in low-income countries.
7. How does indexing wage contracts to inflation help workers?
8. Use the AD/AS model to show how increases in government spending can lead to more inflation.
9. Show, using the AD/AS model, how governments can use monetary policy to decrease the price level.
10. What do international flows of capital have to do with trade imbalances?

11. Use the demand-and-supply of foreign currency graph to determine what would happen to a small, open economy that experienced capital outflows.

Review Questions

12. What is the primary way in which economists measure standards of living?

13. What are some of the other ways of comparing the standard of living in countries around the world?

14. What are the four other factors that determine the economic standard of living around the world?

15. What other factors, aside from labor productivity, capital investment, and technology, impact the economic growth of a country? How?

16. What strategies did the East Asian Tigers employ to stimulate economic growth?

17. What are the two types of unemployment problems?

18. In low-income countries, does it make sense to argue that most of the people without long-term jobs are unemployed?

19. Is inflation likely to be a severe problem for at least some high-income economies in the near future?

20. Is inflation likely to be a problem for at least some low- and middle-income economies in the near future?

21. What are the major issues with regard to trade imbalances for the U.S. economy?

22. What are the major issues with regard to trade imbalances for low- and middle-income countries?

Critical Thinking Questions

23. Demography can have important economic effects. The United States has an aging population. Explain one economic benefit and one economic cost of an aging population as well as of a population that is very young.

24. Explain why is it difficult to set aside funds for investment when you are in poverty.

25. Why do you think it is difficult for high-income countries to achieve high growth rates?

26. Is it possible to protect workers from losing their jobs without distorting the labor market?

27. Explain what will happen in a nation that tries to solve a structural unemployment problem using expansionary monetary and fiscal policy. Draw one AD/AS diagram, based on the Keynesian model, for what the nation hopes will happen. Then draw a second AD/AS diagram, based on the neoclassical model, for what is more likely to happen.

28. Why are inflationary dangers lower in the high-income economies than in low-income and middle-income economies?

29. Explain why converging economies may present a strong argument for limiting flows of capital but not for limiting trade.

Problems

30. Retrieve the following data from The World Bank database (http://databank.worldbank.org/data/home.aspx) for India, Spain, and South Africa for the most recent year available:

- GDP in constant international dollars or PPP
- Population
- GDP per person in constant international dollars
- Mortality rate, infant (per 1,000 live births)
- Health expenditure per capita (current U.S. dollars)
- Life expectancy at birth, total (years)

31. Prepare a chart that compares India, Spain, and South Africa based on the data you find. Describe the key differences between the countries. Rank these as high-, medium-, and low-income countries, explain what is surprising or expected about this data.

32. Use the Rule of 72 to estimate how long it will take for India, Spain, and South Africa to double their standards of living.

33. Using the research skills you have acquired, retrieve the following data from The World Bank database (http://databank.worldbank.org/data/home.aspx) for India, Spain, and South Africa for 2010–2015, if available:

- Telephone lines
- Mobile cellular subscriptions
- Secure Internet servers (per one million people)
- Electricity production (kWh)

Prepare a chart that compares these three countries. Describe the key differences between the countries.

34. Retrieve the unemployment data from The World Bank database (http://databank.worldbank.org/data/home.aspx) for India, Spain, and South Africa for 2011-2015. Prepare a chart that compares India, Spain, and South Africa based on the data. Describe the key differences between the countries. Rank these countries as high-, medium-, and low-income countries. Explain what is surprising or expected about this data. How did the Great Recession impact these countries?

35. Retrieve inflation data from The World Bank data base (http://databank.worldbank.org/data/home.aspx) for India, Spain, and South Africa for 2011–2015. Prepare a chart that compares India, Spain, and South Africa based on the data. Describe the key differences between the countries. Rank these countries as high-, medium-, and low-income. Explain what is surprising or expected about the data.

International Trade

33

FIGURE 33.1 Apple or Samsung iPhone? While the iPhone is readily recognized as an Apple product, many versions (including recently released offerings) have key components made by rival phone-maker, Samsung. In international trade, there are often "conflicts" like this as each country or company focuses on what it does best. (Credit: modification of "iPhone 4's Retina Display v.s. iPhone 3G" by Yutaka Tsutano/Flickr Creative Commons, CC BY 2.0)

CHAPTER OBJECTIVES

In this chapter, you will learn about:

- Absolute and Comparative Advantage
- What Happens When a Country Has an Absolute Advantage in All Goods
- Intra-industry Trade between Similar Economies
- The Benefits of Reducing Barriers to International Trade

Introduction to International Trade

BRING IT HOME

Just Whose iPhone Is It?

The iPhone is a global product. Apple does not manufacture the iPhone components, nor does it assemble them. The assembly is done by Foxconn Corporation, a Taiwanese company, at its factories in China and India. But, Samsung, the electronics firm and competitor to Apple, actually supplies many of the parts that make up an iPhone. In earlier models, Samsung parts made up as much as 26% of the total costs of production. And in more recent versions, Samsung manufactures the displays and cameras. In some ways, then, Samsung is both the biggest

supplier and biggest competitor for Apple. Why do these two firms work together to produce the iPhone? To understand the economic logic behind international trade, you have to accept, as these firms do, that trade is about mutually beneficial exchange. Samsung is one of the world's largest electronics parts suppliers. Apple lets Samsung focus on making the best parts, which allows Apple to concentrate on its strength—designing elegant products that are easy to use. If each company (and by extension each country) focuses on what it does best, there will be gains for all through trade.

We live in a global marketplace. The food on your table might include fresh fruit from Chile, cheese from France, and bottled water from Scotland. Your wireless phone might have been made in Taiwan or Korea. The clothes you wear might be designed in Italy and manufactured in China. The toys you give to a child might have come from India. The car you drive might come from Japan, Germany, or Korea. The gasoline in the tank might be refined from crude oil from Saudi Arabia, Mexico, or Nigeria. As a worker, if your job is involved with farming, machinery, airplanes, cars, scientific instruments, or many other technology-related industries, the odds are good that a hearty proportion of the sales of your employer—and hence the money that pays your salary—comes from export sales. We are all linked by international trade, and the volume of that trade has grown dramatically in the last few decades.

The first wave of globalization started in the nineteenth century and lasted up to the beginning of World War I. Over that time, global exports as a share of global GDP rose from less than 1% of GDP in 1820 to 9% of GDP in 1913. As the Nobel Prize-winning economist Paul Krugman of Princeton University wrote in 1995:

> It is a late-twentieth-century conceit that we invented the global economy just yesterday. In fact, world markets achieved an impressive degree of integration during the second half of the nineteenth century. Indeed, if one wants a specific date for the beginning of a truly global economy, one might well choose 1869, the year in which both the Suez Canal and the Union Pacific railroad were completed. By the eve of the First World War steamships and railroads had created markets for standardized commodities, like wheat and wool, that were fully global in their reach. Even the global flow of information was better than modern observers, focused on electronic technology, tend to realize: the first submarine telegraph cable was laid under the Atlantic in 1858, and by 1900 all of the world's major economic regions could effectively communicate instantaneously.

This first wave of globalization crashed to a halt early in the twentieth century. World War I severed many economic connections. During the Great Depression of the 1930s, many nations misguidedly tried to fix their own economies by reducing foreign trade with others. World War II further hindered international trade. Global flows of goods and financial capital were rebuilt only slowly after World War II. It was not until the early 1980s that global economic forces again became as important, relative to the size of the world economy, as they were before World War I.

33.1 Absolute and Comparative Advantage

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Define absolute advantage, comparative advantage, and opportunity costs
- Explain the gains of trade created when a country specializes

The American statesman Benjamin Franklin (1706–1790) once wrote: "No nation was ever ruined by trade." Many economists would express their attitudes toward international trade in an even more positive manner. The evidence that international trade confers overall benefits on economies is pretty strong. Trade has accompanied economic growth in the United States and around the world. Many of the national economies that have shown the most rapid growth in the last several decades—for example, Japan, South Korea, China, and India—have done so by dramatically orienting their economies toward international trade. There is no modern example of a country that has shut itself off from world trade and yet prospered. To understand the

benefits of trade, or why we trade in the first place, we need to understand the concepts of comparative and absolute advantage.

In 1817, David Ricardo, a businessman, economist, and member of the British Parliament, wrote a treatise called *On the Principles of Political Economy and Taxation*. In this treatise, Ricardo argued that specialization and free trade benefit all trading partners, even those that may be relatively inefficient. To see what he meant, we must be able to distinguish between absolute and comparative advantage.

A country has an **absolute advantage** over another country in producing a good if it uses fewer resources to produce that good. Absolute advantage can be the result of a country's natural endowment. For example, extracting oil in Saudi Arabia is pretty much just a matter of "drilling a hole." Producing oil in other countries can require considerable exploration and costly technologies for drilling and extraction—if they have any oil at all. The United States has some of the richest farmland in the world, making it easier to grow corn and wheat than in many other countries. Guatemala and Colombia have climates especially suited for growing coffee. Chile and Zambia have some of the world's richest copper mines. As some have argued, "geography is destiny." Chile will provide copper and Guatemala will produce coffee, and they will trade. When each country has a product others need and it can produce it with fewer resources in one country than in another, then it is easy to imagine all parties benefitting from trade. However, thinking about trade just in terms of geography and absolute advantage is incomplete. Trade really occurs because of comparative advantage.

Recall from the chapter Choice in a World of Scarcity that a country has a comparative advantage when it can produce a good at a lower cost in terms of other goods. The question each country or company should be asking when it trades is this: "What do we give up to produce this good?" It should be no surprise that the concept of comparative advantage is based on this idea of opportunity cost from Choice in a World of Scarcity. For example, if Zambia focuses its resources on producing copper, it cannot use its labor, land and financial resources to produce other goods such as corn. As a result, Zambia gives up the opportunity to produce corn. How do we quantify the cost in terms of other goods? Simplify the problem and assume that Zambia just needs labor to produce copper and corn. The companies that produce either copper or corn tell you that it takes two hours to mine a ton of copper and one hour to harvest a bushel of corn. This means the opportunity cost of producing a ton of copper is two bushels of corn. The next section develops absolute and comparative advantage in greater detail and relates them to trade.

LINK IT UP

Visit this website (http://openstax.org/l/WTO) for a list of articles and podcasts pertaining to international trade topics.

A Numerical Example of Absolute and Comparative Advantage

Consider a hypothetical world with two countries, Saudi Arabia and the United States, and two products, oil and corn. Further assume that consumers in both countries desire both these goods. These goods are homogeneous, meaning that consumers/producers cannot differentiate between corn or oil from either country. There is only one resource available in both countries, labor hours. Saudi Arabia can produce oil with fewer resources, while the United States can produce corn with fewer resources. Table 33.1 illustrates the advantages of the two countries, expressed in terms of how many hours it takes to produce one unit of each good.

Country	Oil (hours per barrel)	Corn (hours per bushel)
Saudi Arabia	1	4
United States	2	1

TABLE 33.1 How Many Hours It Takes to Produce Oil and Corn

In Table 33.1, Saudi Arabia has an absolute advantage in producing oil because it only takes an hour to produce a barrel of oil compared to two hours in the United States. The United States has an absolute advantage in producing corn.

To simplify, let's say that Saudi Arabia and the United States each have 100 worker hours (see Table 33.2). Figure 33.2 illustrates what each country is capable of producing on its own using a production possibility frontier (PPF) graph. Recall from Choice in a World of Scarcity that the production possibilities frontier shows the maximum amount that each country can produce given its limited resources, in this case workers, and its level of technology.

Country	Oil Production using 100 worker hours (barrels)		Corn Production using 100 worker hours (bushels)
Saudi Arabia	100	or	25
United States	50	or	100

TABLE 33.2 Production Possibilities before Trade

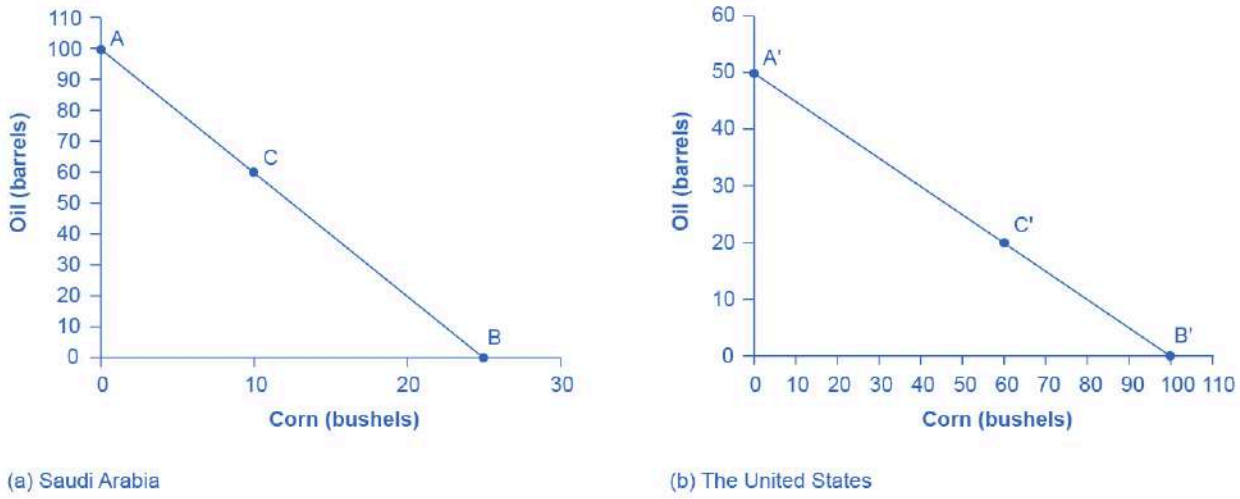


FIGURE 33.2 Production Possibilities Frontiers (a) Saudi Arabia can produce 100 barrels of oil at maximum and zero corn (point A), or 25 bushels of corn and zero oil (point B). It can also produce other combinations of oil and corn if it wants to consume both goods, such as at point C. Here it chooses to produce/consume 60 barrels of oil, leaving 40 work hours that to allocate to produce 10 bushels of corn, using the data in Table 33.1. (b) If the United States produces only oil, it can produce, at maximum, 50 barrels and zero corn (point A'), or at the other extreme, it can produce a maximum of 100 bushels of corn and no oil (point B'). Other combinations of both oil and corn are possible, such as point C'. All points above the frontiers are impossible to produce given the current level of

resources and technology.

Arguably Saudi and U.S. consumers desire both oil and corn to live. Let's say that before trade occurs, both countries produce and consume at point C or C'. Thus, before trade, the Saudi Arabian economy will devote 60 worker hours to produce oil, as Table 33.3 shows. Given the information in Table 33.1, this choice implies that it produces/consumes 60 barrels of oil. With the remaining 40 worker hours, since it needs four hours to produce a bushel of corn, it can produce only 10 bushels. To be at point C', the U.S. economy devotes 40 worker hours to produce 20 barrels of oil and it can allocate the remaining worker hours to produce 60 bushels of corn.

Country	Oil Production (barrels)	Corn Production (bushels)
Saudi Arabia (C)	60	10
United States (C')	20	60
Total World Production	**80**	**70**

TABLE 33.3 Production before Trade

The slope of the production possibility frontier illustrates the opportunity cost of producing oil in terms of corn. Using all its resources, the United States can produce 50 barrels of oil *or* 100 bushels of corn; therefore, the opportunity cost of one barrel of oil is two bushels of corn—or the slope is 1/2. Thus, in the U.S. production possibility frontier graph, every increase in oil production of one barrel implies a decrease of two bushels of corn. Saudi Arabia can produce 100 barrels of oil *or* 25 bushels of corn. The opportunity cost of producing one barrel of oil is the loss of 1/4 of a bushel of corn that Saudi workers could otherwise have produced. In terms of corn, notice that Saudi Arabia gives up the least to produce a barrel of oil. Table 33.4 summarizes these calculations.

Country	Opportunity cost of one unit — Oil (in terms of corn)	Opportunity cost of one unit — Corn (in terms of oil)
Saudi Arabia	¼	4
United States	2	½

TABLE 33.4 Opportunity Cost and Comparative Advantage

Again recall that we defined comparative advantage as the opportunity cost of producing goods. Since Saudi Arabia gives up the least to produce a barrel of oil, ($\frac{1}{4} < 2$ in Table 33.4) it has a comparative advantage in oil production. The United States gives up the least to produce a bushel of corn, so it has a comparative advantage in corn production.

In this example, there is symmetry between absolute and comparative advantage. Saudi Arabia needs fewer worker hours to produce oil (absolute advantage, see Table 33.1), and also gives up the least in terms of other goods to produce oil (comparative advantage, see Table 33.4). Such symmetry is not always the case, as we will show after we have discussed gains from trade fully, but first, read the following Clear It Up feature to make sure you understand why the PPF line in the graphs is straight.

CLEAR IT UP

Can a production possibility frontier be straight?

When you first met the production possibility frontier (PPF) in the chapter on Choice in a World of Scarcity we drew it with an outward-bending shape. This shape illustrated that as we transferred inputs from producing one good to another—like from education to health services—there were increasing opportunity costs. In the examples in this chapter, we draw the PPFs as straight lines, which means that opportunity costs are constant. When we transfer a marginal unit of labor away from growing corn and toward producing oil, the decline in the quantity of corn and the increase in the quantity of oil is always the same. In reality this is possible only if the contribution of additional workers to output did not change as the scale of production changed. The linear production possibilities frontier is a less realistic model, but a straight line simplifies calculations. It also illustrates economic themes like absolute and comparative advantage just as clearly.

Gains from Trade

Consider the trading positions of the United States and Saudi Arabia after they have specialized and traded. Before trade, Saudi Arabia produces/consumes 60 barrels of oil and 10 bushels of corn. The United States produces/consumes 20 barrels of oil and 60 bushels of corn. Given their current production levels, if the United States can trade an amount of corn fewer than 60 bushels and receive in exchange an amount of oil greater than 20 barrels, it will **gain from trade**. With trade, the United States can consume more of both goods than it did without specialization and trade. (Recall that the chapter Welcome to Economics! defined specialization as it applies to workers and firms. Economists also use specialization to describe the occurrence when a country shifts resources to focus on producing a good that offers comparative advantage.) Similarly, if Saudi Arabia can trade an amount of oil less than 60 barrels and receive in exchange an amount of corn greater than 10 bushels, it will have more of both goods than it did before specialization and trade. Table 33.5 illustrates the range of trades that would benefit both sides.

The U.S. economy, after specialization, will benefit if it:	The Saudi Arabian economy, after specialization, will benefit if it:
Exports no more than 60 bushels of corn	Imports at least 10 bushels of corn
Imports at least 20 barrels of oil	Exports less than 60 barrels of oil

TABLE 33.5 The Range of Trades That Benefit Both the United States and Saudi Arabia

The underlying reason why trade benefits both sides is rooted in the concept of opportunity cost, as the following Clear It Up feature explains. If Saudi Arabia wishes to expand domestic production of corn in a world without international trade, then based on its opportunity costs it must give up four barrels of oil for every one additional bushel of corn. If Saudi Arabia could find a way to give up less than four barrels of oil for an additional bushel of corn (or equivalently, to receive more than one bushel of corn for four barrels of oil), it would be better off.

CLEAR IT UP

What are the opportunity costs and gains from trade?

The range of trades that will benefit each country is based on the country's opportunity cost of producing each good. The United States can produce 100 bushels of corn or 50 barrels of oil. For the United States, the opportunity cost of producing one barrel of oil is two bushels of corn. If we divide the numbers above by 50, we get the same ratio: one

barrel of oil is equivalent to two bushels of corn, or (100/50 = 2 and 50/50 = 1). In a trade with Saudi Arabia, if the United States is going to give up 100 bushels of corn in exports, it must import at least 50 barrels of oil to be just as well off. Clearly, to gain from trade it needs to be able to gain more than a half barrel of oil for its bushel of corn—or why trade at all?

Recall that David Ricardo argued that if each country specializes in its comparative advantage, it will benefit from trade, and total global output will increase. How can we show gains from trade as a result of comparative advantage and specialization? Table 33.6 shows the output assuming that each country specializes in its comparative advantage and produces no other good. This is 100% specialization. Specialization leads to an increase in total world production. (Compare the total world production in Table 33.3 to that in Table 33.6.)

Country	Quantity produced after 100% specialization — Oil (barrels)	Quantity produced after 100% specialization — Corn (bushels)
Saudi Arabia	100	0
United States	0	100
Total World Production	**100**	**100**

TABLE 33.6 How Specialization Expands Output

What if we did not have complete specialization, as in Table 33.6? Would there still be gains from trade? Consider another example, such as when the United States and Saudi Arabia start at C and C', respectively, as Figure 33.2 shows. Consider what occurs when trade is allowed and the United States exports 20 bushels of corn to Saudi Arabia in exchange for 20 barrels of oil.

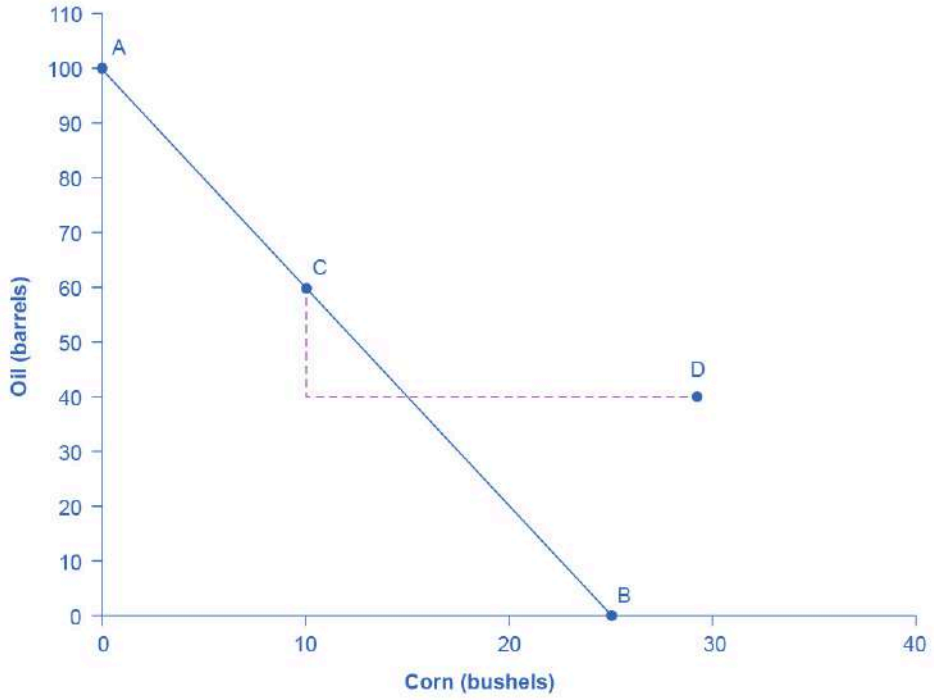


FIGURE 33.3 Production Possibilities Frontier in Saudi Arabia Trade allows a country to go beyond its domestic production-possibility frontier

Starting at point C, which shows Saudi oil production of 60, reduce Saudi oil domestic oil consumption by 20, since 20 is exported to the United States and exchanged for 20 units of corn. This enables Saudi to reach point D, where oil consumption is now 40 barrels and corn consumption has increased to 30 (see Figure 33.3). Notice that even without 100% specialization, if the "trading price," in this case 20 barrels of oil for 20 bushels of corn, is greater than the country's opportunity cost, the Saudis will gain from trade. Since the post-trade consumption point D is beyond its production possibility frontier, Saudi Arabia has gained from trade.

LINK IT UP

Visit this website (http://wits.worldbank.org/trade-visualization.aspx) for trade-related data visualizations.

33.2 What Happens When a Country Has an Absolute Advantage in All Goods

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Show the relationship between production costs and comparative advantage
- Identify situations of mutually beneficial trade
- Identify trade benefits by considering opportunity costs

What happens to the possibilities for trade if one country has an absolute advantage in everything? This is typical for high-income countries that often have well-educated workers, technologically advanced equipment, and the most up-to-date production processes. These high-income countries can produce all products with fewer resources than a low-income country. If the high-income country is more productive across the board, will there still be gains from trade? Good students of Ricardo understand that trade is about mutually beneficial exchange. Even when one country has an absolute advantage in all products, trade can still benefit both sides. This is because gains from trade come from specializing in one's comparative advantage.

Production Possibilities and Comparative Advantage

Consider the example of trade between the United States and Mexico described in Table 33.7. In this example, it takes four U.S. workers to produce 1,000 pairs of shoes, but it takes five Mexican workers to do so. It takes one U.S. worker to produce 1,000 refrigerators, but it takes four Mexican workers to do so. The United States has an absolute advantage in productivity with regard to both shoes and refrigerators; that is, it takes fewer workers in the United States than in Mexico to produce both a given number of shoes and a given number of refrigerators.

Country	Number of Workers needed to produce 1,000 units — Shoes	Number of Workers needed to produce 1,000 units — Refrigerators
United States	4 workers	1 worker
Mexico	5 workers	4 workers

TABLE 33.7 Resources Needed to Produce Shoes and Refrigerators

Absolute advantage simply compares the productivity of a worker between countries. It answers the question, "How many inputs do I need to produce shoes in Mexico?" Comparative advantage asks this same question slightly differently. Instead of comparing how many workers it takes to produce a good, it asks, "How much am I giving up to produce this good in this country?" Another way of looking at this is that comparative advantage identifies the good for which the producer's absolute advantage is relatively larger, or where the producer's absolute productivity disadvantage is relatively smaller. The United States can produce 1,000 shoes with four-fifths as many workers as Mexico (four versus five), but it can produce 1,000 refrigerators with only one-

quarter as many workers (one versus four). So, the comparative advantage of the United States, where its absolute productivity advantage is relatively greatest, lies with refrigerators, and Mexico's comparative advantage, where its absolute productivity disadvantage is least, is in the production of shoes.

Mutually Beneficial Trade with Comparative Advantage

When nations increase production in their area of comparative advantage and trade with each other, both countries can benefit. Again, the production possibility frontier is a useful tool to visualize this benefit.

Consider a situation where the United States and Mexico each have 40 workers. For example, as Table 33.8 shows, if the United States divides its labor so that 40 workers are making shoes, then, since it takes four workers in the United States to make 1,000 shoes, a total of 10,000 shoes will be produced. (If four workers can make 1,000 shoes, then 40 workers will make 10,000 shoes). If the 40 workers in the United States are making refrigerators, and each worker can produce 1,000 refrigerators, then a total of 40,000 refrigerators will be produced.

Country	Shoe Production — using 40 workers		Refrigerator Production — using 40 workers
United States	10,000 shoes	or	40,000 refrigerators
Mexico	8,000 shoes	or	10,000 refrigerators

TABLE 33.8 Production Possibilities before Trade with Complete Specialization

As always, the slope of the production possibility frontier for each country is the opportunity cost of one refrigerator in terms of foregone shoe production–when labor is transferred from producing the latter to producing the former (see Figure 33.4).

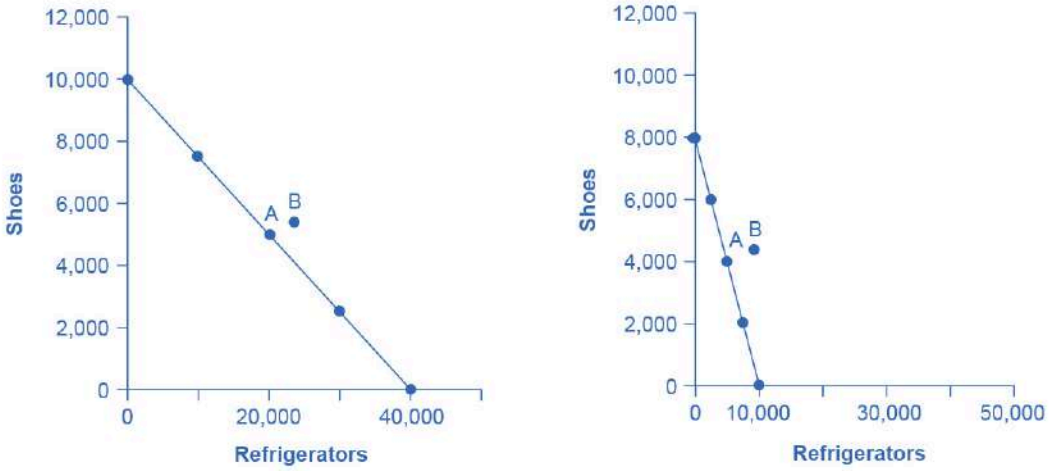


FIGURE 33.4 Production Possibility Frontiers (a) With 40 workers, the United States can produce either 10,000 shoes and zero refrigerators or 40,000 refrigerators and zero shoes. (b) With 40 workers, Mexico can produce a maximum of 8,000 shoes and zero refrigerators, or 10,000 refrigerators and zero shoes. All other points on the production possibility line are possible combinations of the two goods that can be produced given current resources. Point A on both graphs is where the countries start producing and consuming before trade. Point B is where they end up after trade.

Let's say that, in the situation before trade, each nation prefers to produce a combination of shoes and refrigerators that is shown at point A. Table 33.9 shows the output of each good for each country and the total

output for the two countries.

Country	Current Shoe Production	Current Refrigerator Production
United States	5,000	20,000
Mexico	4,000	5,000
Total	**9,000**	**25,000**

TABLE 33.9 Total Production at Point A before Trade

Continuing with this scenario, suppose that each country transfers some amount of labor toward its area of comparative advantage. For example, the United States transfers six workers away from shoes and toward producing refrigerators. As a result, U.S. production of shoes decreases by 1,500 units (6/4 × 1,000), while its production of refrigerators increases by 6,000 (that is, 6/1 × 1,000). Mexico also moves production toward its area of comparative advantage, transferring 10 workers away from refrigerators and toward production of shoes. As a result, production of refrigerators in Mexico falls by 2,500 (10/4 × 1,000), but production of shoes increases by 2,000 pairs (10/5 × 1,000). Notice that when both countries shift production toward each of their comparative advantages (what they are relatively better at), their combined production of both goods rises, as shown in Table 33.10. The reduction of shoe production by 1,500 pairs in the United States is more than offset by the gain of 2,000 pairs of shoes in Mexico, while the reduction of 2,500 refrigerators in Mexico is more than offset by the additional 6,000 refrigerators produced in the United States.

Country	Shoe Production	Refrigerator Production
United States	3,500	26,000
Mexico	6,000	2,500
Total	**9,500**	**28,500**

TABLE 33.10 Shifting Production Toward Comparative Advantage Raises Total Output

This numerical example illustrates the remarkable insight of comparative advantage: even when one country has an absolute advantage in all goods and another country has an absolute disadvantage in all goods, both countries can still benefit from trade. Even though the United States has an absolute advantage in producing both refrigerators and shoes, it makes economic sense for it to specialize in the good for which it has a comparative advantage. The United States will export refrigerators and in return import shoes.

How Opportunity Cost Sets the Boundaries of Trade

This example shows that both parties can benefit from specializing in their comparative advantages and trading. By using the opportunity costs in this example, it is possible to identify the range of possible trades that would benefit each country.

Mexico started out, before specialization and trade, producing 4,000 pairs of shoes and 5,000 refrigerators (see Figure 33.4 and Table 33.9). Then, in the numerical example given, Mexico shifted production toward its comparative advantage and produced 6,000 pairs of shoes but only 2,500 refrigerators. Thus, if Mexico can export no more than 2,000 pairs of shoes (giving up 2,000 pairs of shoes) in exchange for imports of at least 2,500 refrigerators (a gain of 2,500 refrigerators), it will be able to consume more of both goods than before trade. Mexico will be unambiguously better off. Conversely, the United States started off, before specialization

and trade, producing 5,000 pairs of shoes and 20,000 refrigerators. In the example, it then shifted production toward its comparative advantage, producing only 3,500 shoes but 26,000 refrigerators. If the United States can export no more than 6,000 refrigerators in exchange for imports of at least 1,500 pairs of shoes, it will be able to consume more of both goods and will be unambiguously better off.

The range of trades that can benefit both nations is shown in Table 33.11. For example, a trade where the U.S. exports 4,000 refrigerators to Mexico in exchange for 1,800 pairs of shoes would benefit both sides, in the sense that both countries would be able to consume more of both goods than in a world without trade.

The U.S. economy, after specialization, will benefit if it:	The Mexican economy, after specialization, will benefit if it:
Exports fewer than 6,000 refrigerators	*Imports* at least 2,500 refrigerators
Imports at least 1,500 pairs of shoes	*Exports* no more than 2,000 pairs of shoes

TABLE 33.11 The Range of Trades That Benefit Both the United States and Mexico

Trade allows each country to take advantage of lower opportunity costs in the other country. If Mexico wants to produce more refrigerators without trade, it must face its domestic opportunity costs and reduce shoe production. If Mexico, instead, produces more shoes and then trades for refrigerators made in the United States, where the opportunity cost of producing refrigerators is lower, Mexico can in effect take advantage of the lower opportunity cost of refrigerators in the United States. Conversely, when the United States specializes in its comparative advantage of refrigerator production and trades for shoes produced in Mexico, international trade allows the United States to take advantage of the lower opportunity cost of shoe production in Mexico.

The theory of comparative advantage explains why countries trade: they have different comparative advantages. It shows that the gains from international trade result from pursuing comparative advantage and producing at a lower opportunity cost. The following Work It Out feature shows how to calculate absolute and comparative advantage and the way to apply them to a country's production.

WORK IT OUT

Calculating Absolute and Comparative Advantage

In Canada a worker can produce 20 barrels of oil or 40 tons of lumber. In Venezuela, a worker can produce 60 barrels of oil or 30 tons of lumber.

Country	Oil (barrels)		Lumber (tons)
Canada	20	or	40
Venezuela	60	or	30

TABLE 33.12

a. Who has the absolute advantage in the production of oil or lumber? How can you tell?
b. Which country has a comparative advantage in the production of oil?
c. Which country has a comparative advantage in producing lumber?
d. In this example, is absolute advantage the same as comparative advantage, or not?
e. In what product should Canada specialize? In what product should Venezuela specialize?

Step 1. Make a table like Table 33.12.

Step 2. To calculate absolute advantage, look at the larger of the numbers for each product. One worker in Canada can produce more lumber (40 tons versus 30 tons), so Canada has the absolute advantage in lumber. One worker in Venezuela can produce 60 barrels of oil compared to a worker in Canada who can produce only 20.

Step 3. To calculate comparative advantage, find the opportunity cost of producing one barrel of oil in both countries. The country with the lowest opportunity cost has the comparative advantage. With the same labor time, Canada can produce either 20 barrels of oil or 40 tons of lumber. So in effect, 20 barrels of oil is equivalent to 40 tons of lumber: 20 oil = 40 lumber. Divide both sides of the equation by 20 to calculate the opportunity cost of one barrel of oil in Canada. 20/20 oil = 40/20 lumber. 1 oil = 2 lumber. To produce one additional barrel of oil in Canada has an opportunity cost of 2 lumber. Calculate the same way for Venezuela: 60 oil = 30 lumber. Divide both sides of the equation by 60. One oil in Venezuela has an opportunity cost of 1/2 lumber. Because 1/2 lumber < 2 lumber, Venezuela has the comparative advantage in producing oil.

Step 4. Calculate the opportunity cost of one lumber by reversing the numbers, with lumber on the left side of the equation. In Canada, 40 lumber is equivalent in labor time to 20 barrels of oil: 40 lumber = 20 oil. Divide each side of the equation by 40. The opportunity cost of one lumber is 1/2 oil. In Venezuela, the equivalent labor time will produce 30 lumber or 60 oil: 30 lumber = 60 oil. Divide each side by 30. One lumber has an opportunity cost of two oil. Canada has the lower opportunity cost in producing lumber.

Step 5. In this example, absolute advantage is the same as comparative advantage. Canada has the absolute and comparative advantage in lumber; Venezuela has the absolute and comparative advantage in oil.

Step 6. Canada should specialize in the commodity for which it has a relative lower opportunity cost, which is lumber, and Venezuela should specialize in oil. Canada will be exporting lumber and importing oil, and Venezuela will be exporting oil and importing lumber.

Comparative Advantage Goes Camping

To build an intuitive understanding of how comparative advantage can benefit all parties, set aside examples that involve national economies for a moment and consider the situation of a group of friends who decide to go camping together. The six friends have a wide range of skills and experiences, but one person in particular, Jethro, has done lots of camping before and is also a great athlete. Jethro has an absolute advantage in all aspects of camping: he is faster at carrying a backpack, gathering firewood, paddling a canoe, setting up tents, making a meal, and washing up. So here is the question: Because Jethro has an absolute productivity advantage in everything, should he do all the work?

Of course not! Even if Jethro is willing to work like a mule while everyone else sits around, he, like all mortals, only has 24 hours in a day. If everyone sits around and waits for Jethro to do everything, not only will Jethro be an unhappy camper, but there will not be much output for his group of six friends to consume. The theory of comparative advantage suggests that everyone will benefit if they figure out their areas of comparative advantage—that is, the area of camping where their productivity disadvantage is least, compared to Jethro. For example, it may be that Jethro is 80% faster at building fires and cooking meals than anyone else, but only 20% faster at gathering firewood and 10% faster at setting up tents. In that case, Jethro should focus on building fires and making meals, and others should attend to the other tasks, each according to where their productivity disadvantage is smallest. If the campers coordinate their efforts according to comparative advantage, they can all gain.

33.3 Intra-industry Trade between Similar Economies

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Identify at least two advantages of intra-industry trading
- Explain the relationship between economies of scale and intra-industry trade

Absolute and comparative advantages explain a great deal about global trading patterns. For example, they help to explain the patterns that we noted at the start of this chapter, like why you may be eating fresh fruit from Chile or Mexico, or why lower productivity regions like Africa and Latin America are able to sell a substantial proportion of their exports to higher productivity regions like the European Union and North America. Comparative advantage, however, at least at first glance, does not seem especially well-suited to explain other common patterns of international trade.

The Prevalence of Intra-Industry Trade between Similar Economies

The theory of comparative advantage suggests that trade should happen between economies with large differences in opportunity costs of production. Roughly half of all U.S. trade involves shipping goods between the fairly similar high-income economies of Japan, Canada, and the United States. Furthermore, the trade has an important geographic component—the biggest trading partners of the United States are Canada and Mexico (see Table 33.13).

Country	U.S. Exports Go to ...	U.S. Imports Come from ...
China	8.6%	17.7%
Canada	17.6%	12.6%
Japan	4.3%	4.3%
Mexico	15.8%	13.6%
South Korea	3.8%	3.3%

TABLE 33.13 Top Trading Partners (November 2021) (Source: https://www.census.gov/foreign-trade/statistics/highlights/toppartners.html)

Moreover, the theory of comparative advantage suggests that each economy should specialize to a degree in certain products, and then exchange those products. A high proportion of trade, however, is **intra-industry trade**—that is, trade of goods within the same industry from one country to another. For example, the United States produces and exports autos and imports autos. Table 33.14 shows some of the largest categories of U.S. exports and imports. In all of these categories, the United States is both a substantial exporter and a substantial importer of goods from the same industry. In 2021, according to the U.S. Census Bureau, the United States exported $131 billion worth of autos, and imported $317 billion worth of autos. About 60% of U.S. trade and 60% of European trade is intra-industry trade.

Some U.S. Exports	Quantity of Exports ($ billions)	Quantity of Imports ($ billions)
Autos	$131	$317
Food and beverages	$147	$167
Capital goods	$474	$695
Consumer goods	$201	$699
Industrial supplies	$578	$589
Other transportation	$63	$113

TABLE 33.14 Some Intra-Industry U.S. Exports and Imports in 2021 (Source: https://www.census.gov/foreign-trade/data/index.html)

Why do similar high-income economies engage in intra-industry trade? What can be the economic benefit of having workers of fairly similar skills making cars, computers, machinery and other products which are then shipped across the oceans to and from the United States, the European Union, and Japan? There are two reasons: (1) The division of labor leads to learning, innovation, and unique skills; and (2) economies of scale.

Gains from Specialization and Learning

Consider the category of machinery, where the U.S. economy has considerable intra-industry trade. Machinery comes in many varieties, so the United States may be exporting machinery for manufacturing with wood, but importing machinery for photographic processing. The underlying reason why a country like the United States, Japan, or Germany produces one kind of machinery rather than another is usually not related to U.S., German, or Japanese firms and workers having generally higher or lower skills. It is just that, in working on very specific and particular products, firms in certain countries develop unique and different skills.

Specialization in the world economy can be very finely split. In fact, recent years have seen a trend in international trade, which economists call **splitting up the value chain**. The **value chain** describes how a good is produced in stages. As indicated in the beginning of the chapter, producing the iPhone involves designing and engineering the phone in the United States, supplying parts from Korea, assembling the parts in China, and advertising and marketing in the United States. Thanks in large part to improvements in communication technology, sharing information, and transportation, it has become easier to split up the value chain. Instead of production in a single large factory, different firms operating in various places and even different countries can divide the value chain. Because firms split up the value chain, international trade often does not involve nations trading whole finished products like automobiles or refrigerators. Instead, it involves shipping more specialized goods like, say, automobile dashboards or the shelving that fits inside refrigerators. Intra-industry trade between similar countries produces economic gains because it allows workers and firms to learn and innovate on particular products—and often to focus on very particular parts of the value chain.

LINK IT UP

Visit this website (http://openstax.org/l/iphoneassembly) for some interesting information about the assembly of the iPhone.

Economies of Scale, Competition, Variety

A second broad reason that intra-industry trade between similar nations produces economic gains involves economies of scale. The concept of economies of scale, as we introduced in Production, Costs and Industry Structure, means that as the scale of output goes up, average costs of production decline—at least up to a point.

Figure 33.5 illustrates economies of scale for a plant producing toaster ovens. The horizontal axis of the figure shows the quantity of production by a certain firm or at a certain manufacturing plant. The vertical axis measures the average cost of production. Production plant S produces a small level of output at 30 units and has an average cost of production of $30 per toaster oven. Plant M produces at a medium level of output at 50 units, and has an average cost of production of $20 per toaster oven. Plant L produces 150 units of output with an average cost of production of only $10 per toaster oven. Although plant V can produce 200 units of output, it still has the same unit cost as Plant L.

In this example, a small or medium plant, like S or M, will not be able to compete in the market with a large or a very large plant like L or V, because the firm that operates L or V will be able to produce and sell its output at a lower price. In this example, economies of scale operate up to point L, but beyond point L to V, the additional scale of production does not continue to reduce average costs of production.

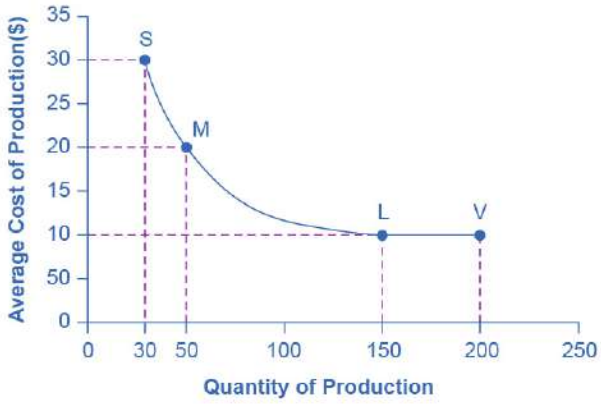


FIGURE 33.5 Economies of Scale Production Plant S, has an average cost of production of $30 per toaster oven. Production plant M has an average cost of production of $20 per toaster oven. Production plant L has an average cost of production of only $10 per toaster oven. Production plant V still has an average cost of production of $10 per toaster oven. Thus, production plant M can produce toaster ovens more cheaply than plant S because of economies of scale, and plants L or V can produce more cheaply than S or M because of economies of scale. However, the economies of scale end at an output level of 150. Plant V, despite being larger, cannot produce more cheaply on average than plant L.

The concept of economies of scale becomes especially relevant to international trade when it enables one or two large producers to supply the entire country. For example, a single large automobile factory could probably supply all the cars consumers purchase in a smaller economy like the United Kingdom or Belgium in a given year. However, if a country has only one or two large factories producing cars, and no international trade, then consumers in that country would have relatively little choice between kinds of cars (other than the color of the paint and other nonessential options). Little or no competition will exist between different car manufacturers.

International trade provides a way to combine the lower average production costs that come from economies of scale and still have competition and variety for consumers. Large automobile factories in different countries can make and sell their products around the world. If General Motors, Ford, and Chrysler were the only players in the U.S. automobile market, the level of competition and consumer choice would be considerably lower than when U.S. carmakers must face competition from Toyota, Honda, Suzuki, Fiat, Mitsubishi, Nissan, Volkswagen, Kia, Hyundai, BMW, Subaru, and others. Greater competition brings with it innovation and responsiveness to what consumers want. America's car producers make far better cars now than they did several decades ago, and much of the reason is competitive pressure, especially from East Asian and European carmakers.

Dynamic Comparative Advantage

The sources of gains from intra-industry trade between similar economies—namely, the learning that comes from a high degree of specialization and splitting up the value chain and from economies of scale—do not

contradict the earlier theory of comparative advantage. Instead, they help to broaden the concept.

In intra-industry trade, climate or geography do not determine the level of worker productivity. Even the general level of education or skill does not determine it. Instead, how firms engage in specific learning about specialized products, including taking advantage of economies of scale determine the level of worker productivity. In this vision, comparative advantage can be dynamic—that is, it can evolve and change over time as one develops new skills and as manufacturers split the value chain in new ways. This line of thinking also suggests that countries are not destined to have the same comparative advantage forever, but must instead be flexible in response to ongoing changes in comparative advantage.

33.4 The Benefits of Reducing Barriers to International Trade

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Explain tariffs as barriers to trade
- Identify at least two benefits of reducing barriers to international trade

Tariffs are taxes that governments place on imported goods for a variety of reasons. Some of these reasons include protecting sensitive industries, for humanitarian reasons, and protecting against dumping. Traditionally, tariffs were used simply as a political tool to protect certain vested economic, social, and cultural interests. The World Trade Organization (WTO) is committed to lowering barriers to trade. The world's nations meet through the WTO to negotiate how they can reduce barriers to trade, such as tariffs. WTO negotiations happen in "rounds," where all countries negotiate one agreement to encourage trade, take a year or two off, and then start negotiating a new agreement. The current round of negotiations is called the Doha Round because it was officially launched in Doha, the capital city of Qatar, in November 2001. In 2010, the WTO noted that the Doha Round's emphasis on market access and reforms of agricultural subsidies could add $121–$202 billion to the world economy.

In the context of a global economy that currently produces more than $80 trillion of goods and services each year, this amount is not large: it is an increase of less than 1%. But before dismissing the gains from trade too quickly, it is worth remembering two points.

- First, a gain of a few hundred billion dollars is enough money to deserve attention! Moreover, remember that this increase is not a one-time event; it would persist each year into the future.
- Second, the estimate of gains may be on the low side because some of the gains from trade are not measured especially well in economic statistics. For example, it is difficult to measure the potential advantages to consumers of having a variety of products available and a greater degree of competition among producers. Perhaps the most important unmeasured factor is that trade between countries, especially when firms are splitting up the value chain of production, often involves a transfer of knowledge that can involve skills in production, technology, management, finance, and law.

Low-income countries benefit more from trade than high-income countries do. In some ways, the giant U.S. economy has less need for international trade, because it can already take advantage of internal trade within its economy. However, many smaller national economies around the world, in regions like Latin America, Africa, the Middle East, and Asia, have much more limited possibilities for trade inside their countries or their immediate regions. Without international trade, they may have little ability to benefit from comparative advantage, slicing up the value chain, or economies of scale. Moreover, smaller economies often have fewer competitive firms making goods within their economy, and thus firms have less pressure from other firms to provide the goods and prices that consumers want.

The economic gains from expanding international trade are measured in hundreds of billions of dollars, and the gains from international trade as a whole probably reach well into the trillions of dollars. The potential for gains from trade may be especially high among the smaller and lower-income countries of the world.

LINK IT UP

Visit this website (http://openstax.org/l/tradebenefits) for a list of some benefits of trade.

From Interpersonal to International Trade

Most people find it easy to believe that they, personally, would not be better off if they tried to grow and process all of their own food, to make all of their own clothes, to build their own cars and houses from scratch, and so on. Instead, we all benefit from living in economies where people and firms can specialize and trade with each other.

The benefits of trade do not stop at national boundaries, either. Earlier we explained that the division of labor could increase output for three reasons: (1) workers with different characteristics can specialize in the types of production where they have a comparative advantage; (2) firms and workers who specialize in a certain product become more productive with learning and practice; and (3) economies of scale. These three reasons apply from the individual and community level right up to the international level. If it makes sense to you that interpersonal, intercommunity, and interstate trade offer economic gains, it should make sense that international trade offers gains, too.

International trade currently involves about $20 trillion worth of goods and services moving around the globe. Any economic force of that size, even if it confers overall benefits, is certain to cause disruption and controversy. This chapter has only made the case that trade brings economic benefits. Other chapters discuss, in detail, the public policy arguments over whether to restrict international trade.

BRING IT HOME

Just Whose iPhone Is It?

Apple Corporation uses a global platform to produce the iPhone. Now that you understand the concept of comparative advantage, you can see why the engineering and design of the iPhone is done in the United States. The United States has built up a comparative advantage over the years in designing and marketing products, and sacrifices fewer resources to design high-tech devices relative to other countries. China has a comparative advantage in assembling the phone due to its large skilled labor force. Korea has a comparative advantage in producing components. Korea focuses its production by increasing its scale, learning better ways to produce screens and computer chips, and uses innovation to lower average costs of production. Apple, in turn, benefits because it can purchase these quality products at lower prices. Put the global assembly line together and you have the device with which we are all so familiar.

Key Terms

absolute advantage when one country can use fewer resources to produce a good compared to another country; when a country is more productive compared to another country
gain from trade a country that can consume more than it can produce as a result of specialization and trade
intra-industry trade international trade of goods within the same industry
splitting up the value chain many of the different stages of producing a good happen in different geographic locations
tariffs taxes that governments place on imported goods
value chain how a good is produced in stages

Key Concepts and Summary

33.1 Absolute and Comparative Advantage

A country has an absolute advantage in those products in which it has a productivity edge over other countries; it takes fewer resources to produce a product. A country has a comparative advantage when it can produce a good at a lower cost in terms of other goods. Countries that specialize based on comparative advantage gain from trade.

33.2 What Happens When a Country Has an Absolute Advantage in All Goods

Even when a country has high levels of productivity in all goods, it can still benefit from trade. Gains from trade come about as a result of comparative advantage. By specializing in a good that it gives up the least to produce, a country can produce more and offer that additional output for sale. If other countries specialize in the area of their comparative advantage as well and trade, the highly productive country is able to benefit from a lower opportunity cost of production in other countries.

33.3 Intra-industry Trade between Similar Economies

A large share of global trade happens between high-income economies that are quite similar in having well-educated workers and advanced technology. These countries practice intra-industry trade, in which they import and export the same products at the same time, like cars, machinery, and computers. In the case of intra-industry trade between economies with similar income levels, the gains from trade come from specialized learning in very particular tasks and from economies of scale. Splitting up the value chain means that several stages of producing a good take place in different countries around the world.

33.4 The Benefits of Reducing Barriers to International Trade

Tariffs are placed on imported goods as a way of protecting sensitive industries, for humanitarian reasons, and for protection against dumping. Traditionally, tariffs were used as a political tool to protect certain vested economic, social, and cultural interests. The WTO has been, and continues to be, a way for nations to meet and negotiate in order to reduce barriers to trade. The gains of international trade are very large, especially for smaller countries, but are beneficial to all.

Self-Check Questions

1. True or False: The source of comparative advantage must be natural elements like climate and mineral deposits. Explain.

2. Brazil can produce 100 pounds of beef or 10 autos. In contrast the United States can produce 40 pounds of beef or 30 autos. Which country has the absolute advantage in beef? Which country has the absolute advantage in producing autos? What is the opportunity cost of producing one pound of beef in Brazil? What is the opportunity cost of producing one pound of beef in the United States?

3. In France it takes one worker to produce one sweater, and one worker to produce one bottle of wine. In Tunisia it takes two workers to produce one sweater, and three workers to produce one bottle of wine. Who has the absolute advantage in production of sweaters? Who has the absolute advantage in the production of wine? How can you tell?

4. In Germany it takes three workers to make one television and four workers to make one video camera. In Poland it takes six workers to make one television and 12 workers to make one video camera.
   a. Who has the absolute advantage in the production of televisions? Who has the absolute advantage in the production of video cameras? How can you tell?
   b. Calculate the opportunity cost of producing one additional television set in Germany and in Poland. (Your calculation may involve fractions, which is fine.) Which country has a comparative advantage in the production of televisions?
   c. Calculate the opportunity cost of producing one video camera in Germany and in Poland. Which country has a comparative advantage in the production of video cameras?
   d. In this example, is absolute advantage the same as comparative advantage, or not?
   e. In what product should Germany specialize? In what product should Poland specialize?

5. How can there be any economic gains for a country from both importing and exporting the same good, like cars?

6. Table 33.15 shows how the average costs of production for semiconductors (the "chips" in computer memories) change as the quantity of semiconductors built at that factory increases.
   a. Based on these data, sketch a curve with quantity produced on the horizontal axis and average cost of production on the vertical axis. How does the curve illustrate economies of scale?
   b. If the equilibrium quantity of semiconductors demanded is 90,000, can this economy take full advantage of economies of scale? What about if quantity demanded is 70,000 semiconductors? 50,000 semiconductors? 30,000 semiconductors?
   c. Explain how international trade could make it possible for even a small economy to take full advantage of economies of scale, while also benefiting from competition and the variety offered by several producers.

Quantity of Semiconductors	Average Total Cost
10,000	$8 each
20,000	$5 each
30,000	$3 each
40,000	$2 each
100,000	$2 each

TABLE 33.15

7. If the removal of trade barriers is so beneficial to international economic growth, why would a nation continue to restrict trade on some imported or exported products?

Review Questions

8. What is absolute advantage? What is comparative advantage?

9. Under what conditions does comparative advantage lead to gains from trade?

10. What factors does Paul Krugman identify that supported expanding international trade in the 1800s?

11. Is it possible to have a comparative advantage in the production of a good but not to have an absolute advantage? Explain.

12. How does comparative advantage lead to gains from trade?

13. What is intra-industry trade?

14. What are the two main sources of economic gains from intra-industry trade?

15. What is splitting up the value chain?

16. Are the gains from international trade more likely to be relatively more important to large or small countries?

Critical Thinking Questions

17. Are differences in geography behind the differences in absolute advantages?

18. Why does the United States not have an absolute advantage in coffee?

19. Look at Exercise 33.2. Compute the opportunity costs of producing sweaters and wine in both France and Tunisia. Who has the lowest opportunity cost of producing sweaters and who has the lowest opportunity cost of producing wine? Explain what it means to have a lower opportunity cost.

20. You just overheard your friend say the following: "Poor countries like Malawi have no absolute advantages. They have poor soil, low investments in formal education and hence low-skill workers, no capital, and no natural resources to speak of. Because they have no advantage, they cannot benefit from trade." How would you respond?

21. Look at Table 33.9. Is there a range of trades for which there will be no gains?

22. You just got a job in Washington, D.C. You move into an apartment with some acquaintances. All your roommates, however, are slackers and do not clean up after themselves. You, on the other hand, can clean faster than each of them. You determine that you are 70% faster at dishes and 10% faster with vacuuming. All of these tasks have to be done daily. Which jobs should you assign to your roommates to get the most free time overall? Assume you have the same number of hours to devote to cleaning. Now, since you are faster, you seem to get done quicker than your roommate. What sorts of problems may this create? Can you imagine a trade-related analogy to this problem?

23. Does intra-industry trade contradict the theory of comparative advantage?

24. Do consumers benefit from intra-industry trade?

25. Why might intra-industry trade seem surprising from the point of view of comparative advantage?

26. In World Trade Organization meetings, what do you think low-income countries lobby for?

27. Why might a low-income country put up barriers to trade, such as tariffs on imports?

28. Can a nation's comparative advantage change over time? What factors would make it change?

Problems

29. France and Tunisia both have Mediterranean climates that are excellent for producing/harvesting green beans and tomatoes. In France it takes two hours for each worker to harvest green beans and two hours to harvest a tomato. Tunisian workers need only one hour to harvest the tomatoes but four hours to harvest green beans. Assume there are only two workers, one in each country, and each works 40 hours a week.

a. Draw a production possibilities frontier for each country. *Hint*: Remember the production possibility frontier is the maximum that all workers can produce at a unit of time which, in this problem, is a week.
b. Identify which country has the absolute advantage in green beans and which country has the absolute advantage in tomatoes.
c. Identify which country has the comparative advantage.
d. How much would France have to give up in terms of tomatoes to gain from trade? How much would it have to give up in terms of green beans?

30. In Japan, one worker can make 5 tons of rubber or 80 radios. In Malaysia, one worker can make 10 tons of rubber or 40 radios.

a. Who has the absolute advantage in the production of rubber or radios? How can you tell?
b. Calculate the opportunity cost of producing 80 additional radios in Japan and in Malaysia. (Your calculation may involve fractions, which is fine.) Which country has a comparative advantage in the production of radios?
c. Calculate the opportunity cost of producing 10 additional tons of rubber in Japan and in Malaysia. Which country has a comparative advantage in producing rubber?
d. In this example, does each country have an absolute advantage and a comparative advantage in the same good?
e. In what product should Japan specialize? In what product should Malaysia specialize?

31. Review the numbers for Canada and Venezuela from Table 33.12 which describes how many barrels of oil and tons of lumber the workers can produce. Use these numbers to answer the rest of this question.

a. Draw a production possibilities frontier for each country. Assume there are 100 workers in each country. Canadians and Venezuelans desire both oil and lumber. Canadians want at least 2,000 tons of lumber. Mark a point on their production possibilities where they can get at least 3,000 tons.
b. Assume that the Canadians specialize completely because they figured out they have a comparative advantage in lumber. They are willing to give up 1,000 tons of lumber. How much oil should they ask for in return for this lumber to be as well off as they were with no trade? How much should they ask for if they want to gain from trading with Venezuela? *Note*: We can think of this "ask" as the relative price or trade price of lumber.
c. Is the Canadian "ask" you identified in (b) also beneficial for Venezuelans? Use the production possibilities frontier graph for Venezuela to show that Venezuelans can gain from trade.

32. In Exercise 33.31, is there an "ask" where Venezuelans may say "no thank you" to trading with Canada?

33. From earlier chapters you will recall that technological change shifts the average cost curves. Draw a graph showing how technological change could influence intra-industry trade.

34. Consider two countries: South Korea and Taiwan. Taiwan can produce one million mobile phones per day at the cost of $10 per phone and South Korea can produce 50 million mobile phones at $5 per phone. Assume these phones are the same type and quality and there is only one price. What is the minimum price at which both countries will engage in trade?

35. If trade increases world GDP by 1% per year, what is the global impact of this increase over 10 years? How does this increase compare to the annual GDP of a country like Sri Lanka? Discuss. *Hint*: To answer this question, here are steps you may want to consider. Go to the World Development Indicators (online) published by the World Bank. Find the current level of World GDP in constant international dollars. Also, find the GDP of Sri Lanka in constant international dollars. Once you have these two numbers, compute the amount the additional increase in global incomes due to trade and compare that number to Sri Lanka's GDP.

Globalization and Protectionism 34

FIGURE 34.1 Flat Screen Competition The market for flat-panel displays in the United States is huge. The manufacturers of flat screens in the United States must compete against manufacturers from around the world. (Credit: modification of "IMG_4674" by "Jemimus"/Flickr Creative Commons, CC BY 2.0)

CHAPTER OBJECTIVES

In this chapter, you will learn about:

- Protectionism: An Indirect Subsidy from Consumers to Producers
- International Trade and Its Effects on Jobs, Wages, and Working Conditions
- Arguments in Support of Restricting Imports
- How Trade Policy Is Enacted: Globally, Regionally, and Nationally
- The Tradeoffs of Trade Policy

Introduction to Globalization and Protectionism

BRING IT HOME

What's the Downside of Protection?

Governments are motivated to limit and alter market outcomes for political or social ends. While governments can limit the rise in prices of some products, they cannot control how much people want to buy or how much firms are willing to sell. The laws of demand and supply still hold. Trade policy is an example where regulations can redirect economic forces, but it cannot stop them from manifesting themselves elsewhere.

Flat-panel displays, the displays for laptop computers, tablets, and flat screen televisions, are an example of such an enduring principle. In the early 1990s, the vast majority of flat-panel displays used in U.S.-manufactured laptops were imported, primarily from Japan. The small but politically powerful U.S. flat-panel-display industry filed a

dumping complaint with the Commerce Department. They argued that Japanese firms were selling displays at "less than fair value," which made it difficult for U.S. firms to compete. This argument for trade protection is referred to as anti-dumping. Other arguments for protection in this complaint included national security. After a preliminary determination by the Commerce Department that the Japanese firms were dumping, the U.S. International Trade Commission imposed a 63% dumping margin (or tax) on the import of flat-panel displays. Was this a successful exercise of U.S. trade policy? See what you think after reading the chapter.

The world has become more connected on multiple levels, especially economically. In 1970, imports and exports made up 11% of U.S. GDP, while now they make up 32%. However, the United States, due to its size, is less internationally connected than most countries. For example, according to the World Bank, 97% of Botswana's economic activity is connected to trade. This chapter explores trade policy—the laws and strategies a country uses to regulate international trade. This topic is not without controversy.

As the world has become more globally connected, firms and workers in high-income countries like the United States, Japan, or the nations of the European Union, perceive a competitive threat from firms in medium-income countries like Mexico, China, or South Africa, that have lower costs of living and therefore pay lower wages. Firms and workers in low-income countries fear that they will suffer if they must compete against more productive workers and advanced technology in high-income countries.

On a different tack, some environmentalists worry that multinational firms may evade environmental protection laws by moving their production to countries with loose or nonexistent pollution standards, trading a clean environment for jobs. Some politicians worry that their country may become overly dependent on key imported products, like oil, which in a time of war could threaten national security. All of these fears influence governments to reach the same basic policy conclusion: to protect national interests, whether businesses, jobs, or security, imports of foreign products should be restricted. This chapter analyzes such arguments. First, however, it is essential to learn a few key concepts and understand how the demand and supply model applies to international trade.

34.1 Protectionism: An Indirect Subsidy from Consumers to Producers

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Explain protectionism and its three main forms
- Analyze protectionism through concepts of demand and supply, noting its effects on equilibrium
- Calculate the effects of trade barriers

When a government legislates policies to reduce or block international trade it is engaging in **protectionism**. Protectionist policies often seek to shield domestic producers and domestic workers from foreign competition. Protectionism takes three main forms: tariffs, import quotas, and nontariff barriers.

Recall from International Trade that tariffs are taxes that governments impose on imported goods and services. This makes imports more expensive for consumers, discouraging imports. For example, in 2018, President Trump increased tariffs on Chinese-manufactured goods by 2–25%, including TVs, monitors, desktop PCs, smartwatches, and many other consumer goods. The intention behind the policy was to shelter U.S. manufacturers from competition, helping companies that operate domestically. China responded with tariffs on American goods, launching a trade war. President Biden retained these tariffs and considered additional ones, but as of August 2022, the administration was considering changes designed to reduce inflation.

Another way to control trade is through **import quotas**, which are numerical limitations on the quantity of products that a country can import. For instance, during the early 1980s, the Reagan Administration imposed a quota on the import of Japanese automobiles. In the 1970s, many developed countries, including the United States, found themselves with declining textile industries. Textile production does not require highly skilled

workers, so producers were able to set up lower-cost factories in developing countries. In order to "manage" this loss of jobs and income, the developed countries established an international Multifiber Agreement that essentially divided the market for textile exports between importers and the remaining domestic producers. The agreement, which ran from 1974 to 2004, specified the exact quota of textile imports that each developed country would accept from each low-income country. A similar story exists for sugar imports into the United States, which are still governed by quotas.

Nontariff barriers are all the other ways that a nation can draw up rules, regulations, inspections, and paperwork to make it more costly or difficult to import products. A rule requiring certain safety standards can limit imports just as effectively as high tariffs or low import quotas, for instance. There are also nontariff barriers in the form of "rules-of-origin" regulations; these rules describe the "Made in Country X" label as the one in which the last substantial change in the product took place. A manufacturer wishing to evade import restrictions may try to change the production process so that the last big change in the product happens in their own country. For example, certain textiles are made in the United States, shipped to other countries, combined with textiles made in those other countries to make apparel—and then re-exported back to the United States for a final assembly, to escape paying tariffs or to obtain a "Made in the USA" label.

Despite import quotas, tariffs, and nontariff barriers, the share of apparel sold in the United States that is imported rose from about half in 1999 to about three-quarters today. According to the U.S. Bureau of Labor Statistics (BLS), estimated the number of U.S. jobs in textiles and apparel fell 44% from 2007 to 2014, and will fall by another 25% by 2024. Even more U.S. textile industry jobs would have been lost without tariffs. However, domestic jobs that are saved by import quotas come at a cost. Because textile and apparel protectionism adds to the costs of imports, consumers end up paying billions of dollars more for clothing each year.

When the United States eliminates trade barriers in one area, consumers spend the money they save on that product elsewhere in the economy. Thus, while eliminating trade barriers in one sector of the economy will likely result in some job loss in that sector, consumers will spend the resulting savings in other sectors of the economy and hence increase the number of jobs in those other sectors. Of course, workers in some of the poorest countries of the world who would otherwise have jobs producing textiles, would gain considerably if the United States reduced its barriers to trade in textiles. That said, there are good reasons to be wary about reducing barriers to trade. The 2012 and 2013 Bangladeshi fires in textile factories, which resulted in a horrific loss of life, present complications that our simplified analysis in the chapter will not capture.

Realizing the compromises between nations that come about due to trade policy, many countries came together in 1947 to form the General Agreement on Tariffs and Trade (GATT). (We'll cover the GATT in more detail later in the chapter.) This agreement has since been superseded by the **World Trade Organization (WTO)**, whose membership includes about 150 nations and most of the world's economies. It is the primary international mechanism through which nations negotiate their trade rules—including rules about tariffs, quotas, and nontariff barriers. The next section examines the results of such protectionism and develops a simple model to show the impact of trade policy.

Demand and Supply Analysis of Protectionism

To the non-economist, restricting imports may appear to be nothing more than taking sales from foreign producers and giving them to domestic producers. Other factors are at work, however, because firms do not operate in a vacuum. Instead, firms sell their products either to consumers or to other firms (if they are business suppliers), who are also affected by the trade barriers. A demand and supply analysis of protectionism shows that it is not just a matter of domestic gains and foreign losses, but a policy that imposes substantial domestic costs as well.

Consider two countries, Brazil and the United States, who produce sugar. Each country has a domestic supply and demand for sugar, as Table 34.1 details and Figure 34.2 illustrates. In Brazil, without trade, the

equilibrium price of sugar is 12 cents per pound and the equilibrium output is 30 tons. When there is no trade in the United States, the equilibrium price of sugar is 24 cents per pound and the equilibrium quantity is 80 tons. We label these equilibrium points as point E in each part of the figure.

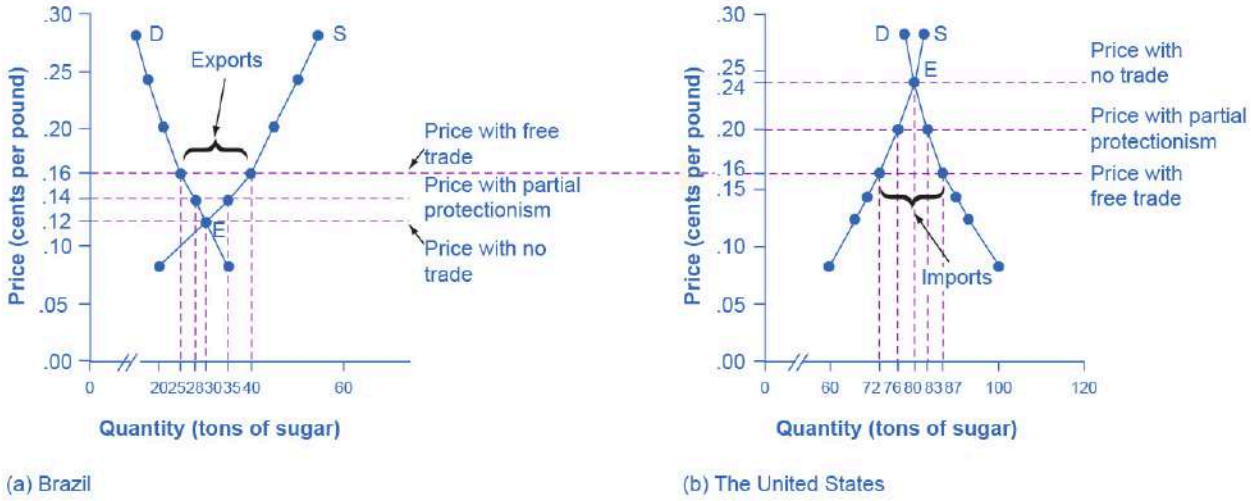


FIGURE 34.2 The Sugar Trade between Brazil and the United States Before trade, the equilibrium price of sugar in Brazil is 12 cents a pound and it is 24 cents per pound in the United States. When trade is allowed, businesses will buy cheap sugar in Brazil and sell it in the United States. This will result in higher prices in Brazil and lower prices in the United States. Ignoring transaction costs, prices should converge to 16 cents per pound, with Brazil exporting 15 tons of sugar and the United States importing 15 tons of sugar. If trade is only partly open between the countries, it will lead to an outcome between the free-trade and no-trade possibilities.

Price	Brazil: Quantity Supplied (tons)	Brazil: Quantity Demanded (tons)	U.S.: Quantity Supplied (tons)	U.S.: Quantity Demanded (tons)
8 cents	20	35	60	100
12 cents	30	30	66	93
14 cents	35	28	69	90
16 cents	40	25	72	87
20 cents	45	21	76	83
24 cents	50	18	80	80
28 cents	55	15	82	78

TABLE 34.1 The Sugar Trade between Brazil and the United States

If international trade between Brazil and the United States now becomes possible, profit-seeking firms will spot an opportunity: buy sugar cheaply in Brazil, and sell it at a higher price in the United States. As sugar is shipped from Brazil to the United States, the quantity of sugar produced in Brazil will be greater than Brazilian consumption (with the extra production exported), and the amount produced in the United States will be less than the amount of U.S. consumption (with the extra consumption imported). Exports to the United States will reduce the sugar supply in Brazil, raising its price. Imports into the United States will increase the sugar supply, lowering its price. When the sugar price is the same in both countries, there is no incentive to trade further. As Figure 34.2 shows, the equilibrium with trade occurs at a price of 16 cents per pound. At that price, the sugar farmers of Brazil supply a quantity of 40 tons, while the consumers of Brazil buy only 25 tons.

The extra 15 tons of sugar production, shown by the horizontal gap between the demand curve and the supply curve in Brazil, is exported to the United States. In the United States, at a price of 16 cents, the farmers produce a quantity of 72 tons and consumers demand a quantity of 87 tons. The excess demand of 15 tons by American consumers, shown by the horizontal gap between demand and domestic supply at the price of 16 cents, is supplied by imported sugar. Free trade typically results in income distribution effects, but the key is to recognize the overall gains from trade, as Figure 34.3 shows. Building on the concepts that we outlined in Demand and Supply and Demand, Supply, and Efficiency in terms of consumer and producer surplus, Figure 34.3 (a) shows that producers in Brazil gain by selling more sugar at a higher price, while Figure 34.3 (b) shows consumers in the United States benefit from the lower price and greater availability of sugar. Consumers in Brazil are worse off (compare their no-trade consumer surplus with the free-trade consumer surplus) and U.S. producers of sugar are worse off. There are gains from trade—an increase in social surplus in each country. That is, both the United States and Brazil are better off than they would be without trade. The following Clear It Up feature explains how trade policy can influence low-income countries.

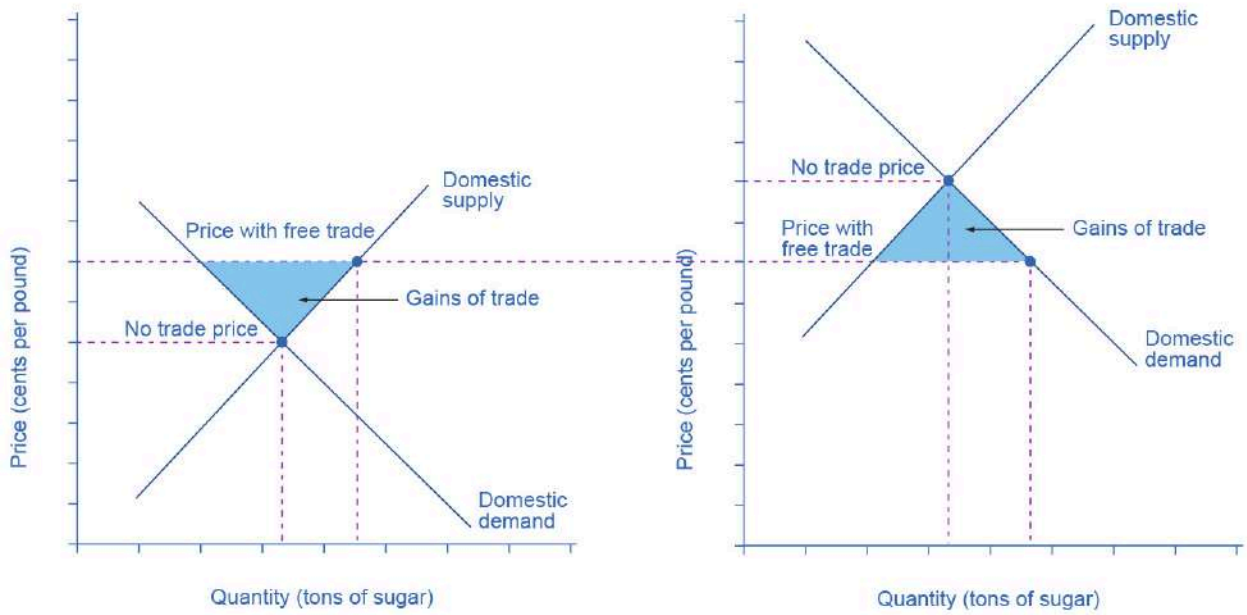


FIGURE 34.3 Free Trade of Sugar Free trade results in gains from trade. Total surplus increases in both countries, as the two blue-shaded areas show. However, there are clear income distribution effects. Producers gain in the exporting country, while consumers lose; and in the importing country, consumers gain and producers lose.

LINK IT UP

Visit this website (http://openstax.org/l/sugartrade) to read more about the global sugar trade.

CLEAR IT UP

Why are there low-income countries?

Why are the poor countries of the world poor? There are a number of reasons, but one of them will surprise you: the trade policies of the high-income countries. Following is a stark review of social priorities which the international aid organization, Oxfam International has widely publicized.

High-income countries of the world—primarily the United States, countries of the European Union, and Japan—subsidize their domestic farmers collectively by about $200 billion per year. Why does this matter?

It matters because the support of farmers in high-income countries is devastating to the livelihoods of farmers in low-income countries. Even when their climate and land are well-suited to products like cotton, rice, sugar, or milk, farmers in low-income countries find it difficult to compete. Farm subsidies in the high-income countries cause farmers in those countries to increase the amount they produce. This increase in supply drives down world prices of farm products below the costs of production. As Michael Gerson of the *Washington Post* describes it: "[T]he effects in the cotton-growing regions of West Africa are dramatic . . . keep[ing] millions of Africans on the edge of malnutrition. In some of the poorest countries on Earth, cotton farmers are some of the poorest people, earning about a dollar a day. . . . Who benefits from the current system of subsidies? About 20,000 American cotton producers, with an average annual income of more than $125,000."

As if subsidies were not enough, often, the high-income countries block agricultural exports from low-income countries. In some cases, the situation gets even worse when the governments of high-income countries, having bought and paid for an excess supply of farm products, give away those products in poor countries and drive local farmers out of business altogether.

For example, shipments of excess milk from the European Union to Jamaica have caused great hardship for Jamaican dairy farmers. Shipments of excess rice from the United States to Haiti drove thousands of low-income rice farmers in Haiti out of business. The opportunity costs of protectionism are not paid just by domestic consumers, but also by foreign producers—and for many agricultural products, those foreign producers are the world's poor.

Now, let's look at what happens with protectionism. U.S. sugar farmers are likely to argue that, if only they could be protected from sugar imported from Brazil, the United States would have higher domestic sugar production, more jobs in the sugar industry, and American sugar farmers would receive a higher price. If the United States government sets a high-enough tariff on imported sugar, or sets an import quota at zero, the result will be that the quantity of sugar traded between countries could be reduced to zero, and the prices in each country will return to the levels before trade was allowed.

Blocking only some trade is also possible. Suppose that the United States passed a sugar import quota of seven tons. The United States will import no more than seven tons of sugar, which means that Brazil can export no more than seven tons of sugar to the United States. As a result, the price of sugar in the United States will be 20 cents, which is the price where the quantity demanded is seven tons greater than the domestic quantity supplied. Conversely, if Brazil can export only seven tons of sugar, then the price of sugar in Brazil will be 14 cents per pound, which is the price where the domestic quantity supplied in Brazil is seven tons greater than domestic demand.

In general, when a country sets a low or medium tariff or import quota, the equilibrium price and quantity will be somewhere between those that prevail with no trade and those with completely free trade. The following Work It Out explores the impact of these trade barriers.

WORK IT OUT

Effects of Trade Barriers

Let's look carefully at the effects of tariffs or quotas. If the U.S. government imposes a tariff or quota sufficient to eliminate trade with Brazil, two things occur: U.S. consumers pay a higher price and therefore buy a smaller quantity of sugar. U.S. producers obtain a higher price and they sell a larger quantity of sugar. We can measure the effects of a tariff on producers and consumers in the United States using two concepts that we developed in Demand, Supply, and Efficiency: consumer surplus and producer surplus.

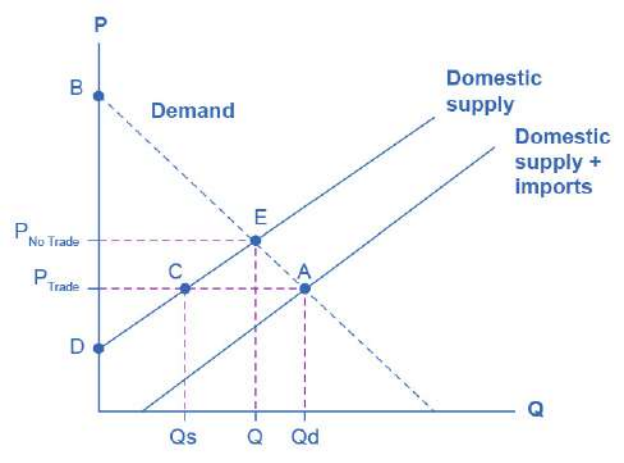


FIGURE 34.4 U.S. Sugar Supply and Demand When there is free trade, the equilibrium is at point A. When there is no trade, the equilibrium is at point E.

Step 1. Look at Figure 34.4, which shows a hypothetical version of the demand and supply of sugar in the United States.

Step 2. Note that when there is free trade the sugar market is in equilibrium at point A where Domestic Quantity Demanded (Qd) = Quantity Supplied (Domestic Qs + Imports from Brazil) at a price of P_{Trade}.

Step 3. Note, also, that imports are equal to the distance between points C and A.

Step 4. Recall that consumer surplus is the value that consumers get beyond what they paid for when they buy a product. Graphically, it is the area under a demand curve but above the price. In this case, the consumer surplus in the United States is the area of the triangle formed by the points P_{Trade}, A, and B.

Step 5. Recall, also, that producer surplus is another name for profit—it is the income producers get above the cost of production, which is shown by the supply curve here. In this case, the producer surplus with trade is the area of the triangle formed by the points P_{trade}, C, and D.

Step 6. Suppose that the barriers to trade are imposed, imports are excluded, and the price rises to $P_{NoTrade}$. Look what happens to producer surplus and consumer surplus. At the higher price, the domestic quantity supplied increases from Qs to Q at point E. Because producers are selling more quantity at a higher price, the producer surplus increases to the area of the triangle $P_{NoTrade}$, E, and D.

Step 7. Compare the areas of the two triangles and you will see the increase in the producer surplus.

Step 8. Examine the consumer surplus. Consumers are now paying a higher price to get a lower quantity (Q instead of Qd). Their consumer surplus shrinks to the area of the triangle $P_{NoTrade}$, E, and B.

Step 9. Determine the net effect. The producer surplus increases by the area P_{trade}, C, E, $P_{NoTrade}$. The loss of consumer surplus, however, is larger. It is the area P_{trade}, A, E, $P_{NoTrade}$. In other words, consumers lose more

than producers gain as a result of the trade barriers and the United States has a lower social surplus.

Who Benefits and Who Pays?

Using the demand and supply model, consider the impact of protectionism on producers and consumers in each of the two countries. For protected producers like U.S. sugar farmers, restricting imports is clearly positive. Without a need to face imported products, these producers are able to sell more, at a higher price. For consumers in the country with the protected good, in this case U.S. sugar consumers, restricting imports is clearly negative. They end up buying a lower quantity of the good and paying a higher price for what they do buy, compared to the equilibrium price and quantity with trade. The following Clear It Up feature considers why a country might outsource jobs even for a domestic product.

CLEAR IT UP

Why are Life Savers, an American product, not made in America?

In 1912, Clarence Crane invented Life Savers, the hard candy with the hole in the middle, in Cleveland, Ohio. Starting in the late 1960s and for 35 years afterward, a plant in Holland, Michigan produced 46 billion Life Savers a year, in 200 million rolls. However, in 2002, the Kraft Company announced that it would close the Michigan plant and move Life Saver production across the border to Montreal, Canada.

One reason is that Canadian workers are paid slightly less, especially in healthcare and insurance costs that are not linked to employment there. Another main reason is that the United States government keeps the sugar price high for the benefit of sugar farmers, with a combination of a government price floor program and strict quotas on imported sugar. In recent years, the price of U.S. sugar has been about double the price of sugar produced by the rest of the world. Life Saver production uses over 100 tons of sugar each day, because the candies are 95% sugar.

A number of other candy companies have also reduced U.S. production and expanded foreign production. Sugar-using industries have eliminated over 100,000 jobs over the last 20 years, more than seven times the total employment in sugar production. While the candy industry is especially affected by the cost of sugar, the costs are spread more broadly. U.S. consumers pay roughly $1 billion per year in higher food prices because of elevated sugar costs. Meanwhile, sugar producers in low-income countries are driven out of business. Because of the sugar subsidies to domestic producers and the quotas on imports, they cannot sell their output profitably, or at all, in the United States market.

The fact that protectionism pushes up prices for consumers in the country enacting such protectionism is not always acknowledged openly, but it is not disputed. After all, if protectionism did not benefit domestic producers, there would not be much point in enacting such policies in the first place. Protectionism is simply a method of requiring consumers to subsidize producers. The subsidy is indirect, since consumers pay for it through higher prices, rather than a direct government subsidy paid with money collected from taxpayers. However, protectionism works like a subsidy, nonetheless. The American satirist Ambrose Bierce defined "tariff" this way in his 1911 book, *The Devil's Dictionary*: "Tariff, n. A scale of taxes on imports, designed to protect the domestic producer against the greed of his consumer."

The effect of protectionism on producers and consumers in the foreign country is complex. When a government uses an import quota to impose partial protectionism, Brazilian sugar producers receive a lower price for the sugar they sell in Brazil—but a higher price for the sugar they are allowed to export to the United States. Notice that some of the burden of protectionism, paid by domestic consumers, ends up in the hands of foreign producers in this case. Brazilian sugar consumers seem to benefit from U.S. protectionism, because it reduces the price of sugar that they pay (compared to the free-trade situation). On the other hand, at least some of these Brazilian sugar consumers also work as sugar farmers, so protectionism reduces their incomes

and jobs. Moreover, if trade between the countries vanishes, Brazilian consumers would miss out on better prices for imported goods—which do not appear in our single-market example of sugar protectionism.

The effects of protectionism on foreign countries notwithstanding, protectionism requires domestic consumers of a product (consumers may include either households or other firms) to pay higher prices to benefit domestic producers of that product. In addition, when a country enacts protectionism, it loses the economic gains it would have been able to achieve through a combination of comparative advantage, specialized learning, and economies of scale, concepts that we discuss in International Trade.

34.2 International Trade and Its Effects on Jobs, Wages, and Working Conditions

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Discuss how international trade influences the job market
- Analyze the opportunity cost of protectionism
- Explain how international trade impacts wages, labor standards, and working conditions

In theory at least, imports might injure workers in several different ways: fewer jobs, lower wages, or poor working conditions. Let's consider these in turn.

Fewer Jobs?

In the early 1990s, the United States was negotiating the North American Free Trade Agreement (NAFTA)[1] with Mexico, an agreement that reduced tariffs, import quotas, and nontariff barriers to trade between the United States, Mexico, and Canada. H. Ross Perot, a 1992 candidate for U.S. president, claimed, in prominent campaign arguments, that if the United States expanded trade with Mexico, there would be a "giant sucking sound" as U.S. employers relocated to Mexico to take advantage of lower wages. After all, average wages in Mexico were, at that time, about one-eighth of those in the United States. NAFTA passed Congress, President Bill Clinton signed it into law, and it took effect in 1995. For the next six years, the United States economy had some of the most rapid job growth and low unemployment in its history. Those who feared that open trade with Mexico would lead to a dramatic decrease in jobs were proven wrong.

This result was no surprise to economists. After all, the trend toward globalization has been going on for decades, not just since NAFTA. If trade reduced the number of available jobs, then the United States should have been seeing a steady loss of jobs for decades. While the United States economy does experience rises and falls in unemployment rates, the number of jobs is not falling over extended periods of time. The number of U.S. jobs rose from 71 million in 1970 to 150 million in 2021.

Protectionism certainly saves jobs in the specific industry being protected but, for two reasons, it costs jobs in other unprotected industries. First, if consumers are paying higher prices to the protected industry, they inevitably have less money to spend on goods from other industries, and so jobs are lost in those other industries. Second, if a firm sells the protected product to other firms, so that other firms must now pay a higher price for a key input, then those firms will lose sales to foreign producers who do not need to pay the higher price. Lost sales translate into lost jobs. The hidden opportunity cost of using protectionism to save jobs in one industry is jobs sacrificed in other industries. This is why the United States International Trade Commission, in its study of barriers to trade, predicts that reducing trade barriers would not lead to an overall loss of jobs. Protectionism reshuffles jobs from industries without import protections to industries that are protected from imports, but it does not create more jobs.

Moreover, the costs of saving jobs through protectionism can be very high. A number of different studies have attempted to estimate the cost to consumers in higher prices per job saved through protectionism. Table 34.2 shows a sample of results, compiled by economists at the Federal Reserve Bank of Dallas. Saving a job through

1 As of July 1, 2020, NAFTA was officially replaced with the United States-Mexico-Canada (USMCA) free trade agreement. It is broadly similar to the original NAFTA.

protectionism typically costs much more than the actual worker's salary. For example, a study published in 2002 compiled evidence that using protectionism to save an average job in the textile and apparel industry would cost $199,000 per job saved. In other words, those workers could have been paid $100,000 per year to be unemployed and the cost would only be half of what it is to keep them working in the textile and apparel industry. This result is not unique to textiles and apparel.

Industry Protected with Import Tariffs or Quotas	Annual Cost per Job Saved
Sugar	$826,000
Polyethylene resins	$812,000
Dairy products	$685,000
Frozen concentrated orange juice	$635,000
Ball bearings	$603,000
Machine tools	$479,000
Women's handbags	$263,000
Glassware	$247,000
Apparel and textiles	$199,000
Rubber footwear	$168,000
Women's nonathletic footwear	$139,000

TABLE 34.2 Cost to U.S. Consumers of Saving a Job through Protectionism
(Source: Federal Reserve Bank of Dallas)

Why does it cost so much to save jobs through protectionism? The basic reason is that not all of the extra money that consumers pay because of tariffs or quotas goes to save jobs. For example, if the government imposes tariffs on steel imports so that steel buyers pay a higher price, U.S. steel companies earn greater profits, buy more equipment, pay bigger bonuses to managers, give pay raises to existing employees—and also avoid firing some additional workers. Only part of the higher price of protected steel goes toward saving jobs. Also, when an industry is protected, the economy as a whole loses the benefits of playing to its comparative advantage—in other words, producing what it is best at. Therefore, part of the higher price that consumers pay for protected goods is lost economic efficiency, which we can measure as another deadweight loss, like what we discussed in Labor and Financial Markets.

There's a bumper sticker that speaks to the threat some U.S. workers feel from imported products: "Buy American—Save U.S. Jobs." If an economist were driving the car, the sticker might declare: "Block Imports—Save Jobs for Some Americans, Lose Jobs for Other Americans, and Also Pay High Prices."

Trade and Wages

Even if trade does not reduce the number of jobs, it could affect wages. Here, it is important to separate issues about the average level of wages from issues about whether the wages of certain workers may be helped or hurt by trade.

Because trade raises the amount that an economy can produce by letting firms and workers play to their comparative advantage, trade will also cause the average level of wages in an economy to rise. Workers who

can produce more will be more desirable to employers, which will shift the demand for their labor out to the right, and increase wages in the labor market. By contrast, barriers to trade will reduce the average level of wages in an economy.

However, even if trade increases the overall wage level, it will still benefit some workers and hurt others. Workers in industries that are confronted by competition from imported products may find that demand for their labor decreases and shifts back to the left, so that their wages decline with a rise in international trade. Conversely, workers in industries that benefit from selling in global markets may find that demand for their labor shifts out to the right, so that trade raises their wages.

LINK IT UP

View this website (http://openstax.org/l/fairtradecoffee) to read an article on the issues surrounding fair trade coffee.

One concern is that while globalization may be benefiting high-skilled, high-wage workers in the United States, it may also impose costs on low-skilled, low-wage workers. After all, high-skilled U.S. workers presumably benefit from increased sales of sophisticated products like computers, machinery, and pharmaceuticals in which the United States has a comparative advantage. Meanwhile, low-skilled U.S. workers must now compete against extremely low-wage workers worldwide for making simpler products like toys and clothing. As a result, the wages of low-skilled U.S. workers are likely to fall. There are, however, a number of reasons to believe that while globalization has helped some U.S. industries and hurt others, it has not focused its negative impact on the wages of low-skilled Americans. First, about half of U.S. trade is intra-industry trade. That means the U.S. trades similar goods with other high-wage economies like Canada, Japan, Germany, and the United Kingdom. For instance, in 2014 the U.S. exported over 2 million cars, from all the major automakers, and also imported several million cars from other countries.

Most U.S. workers in these industries have above-average skills and wages—and many of them do quite well in the world of globalization. Some evidence suggested that intra-industry trade between similar countries had a small impact on domestic workers but later evidence indicates that it all depends on how flexible the labor market is. In other words, the key is how flexible workers are in finding jobs in different industries. The effect of trade on low-wage workers depends considerably on the structure of labor markets and indirect effects felt in other parts of the economy. For example, in the United States and the United Kingdom, because labor market frictions are low, the impact of trade on low income workers is small.

Second, many low-skilled U.S. workers hold service jobs that imports from low-wage countries cannot replace. For example, we cannot import lawn care services or moving and hauling services or hotel maids from countries long distances away like China or Bangladesh. Competition from imported products is not the primary determinant of their wages.

Finally, while the focus of the discussion here is on wages, it is worth pointing out that low-wage U.S. workers suffer due to protectionism in all the industries—even those in which they do not work. For example, food and clothing are protected industries. These low-wage workers therefore pay higher prices for these basic necessities and as such their dollar stretches over fewer goods.

The benefits and costs of increased trade in terms of its effect on wages are not distributed evenly across the economy. However, the growth of international trade has helped to raise the productivity of U.S. workers as a whole—and thus helped to raise the average level of wages.

Labor Standards and Working Conditions

Workers in many low-income countries around the world labor under conditions that would be illegal for a worker in the United States. Workers in countries like China, Thailand, Brazil, South Africa, and Poland are often paid less than the United States minimum wage. For example, in the United States, the national

minimum wage is $7.25 per hour. A typical wage in many low-income countries might be more like $7.25 per day, or often much less. Moreover, working conditions in low-income countries may be extremely unpleasant, or even unsafe. In the worst cases, production may involve the child labor or even workers who are mistreated, abused, or entrapped in their jobs. These concerns over foreign labor standards do not affect most of U.S. trade, which is intra-industry and carried out with other high-income countries that have labor standards similar to the United States, but it is, nonetheless, morally and economically important.

In thinking about labor standards in other countries, it is important to draw some distinctions between what is truly unacceptable and what is painful to think about. Most people, economists included, have little difficulty with the idea that production by six-year-olds confined in factories, by people who are abused or mistreated, or by slave labor is morally unacceptable. They would support aggressive efforts to eliminate such practices—including shutting out imported products made with such labor. Many cases, however, are less clear-cut. An opinion article in the *New York Times* several years ago described the case of Ahmed Zia, a 14-year-old boy from Pakistan. He earned $2 per day working in a carpet factory. He dropped out of school in second grade. Should the United States and other countries refuse to purchase rugs made by Ahmed and his co-workers? If the carpet factories were to close, the likely alternative job for Ahmed is farm work, and as Ahmed says of his carpet-weaving job: "This makes much more money and is more comfortable."

Other workers may have even less attractive alternative jobs, perhaps scavenging garbage or prostitution. The real problem for Ahmed and many others in low-income countries is not that globalization has made their lives worse, but rather that they have so few good life alternatives. The United States went through similar situations during the nineteenth and early twentieth centuries.

In closing, there is some irony when the United States government or U.S. citizens take issue with labor standards in low-income countries, because the United States is not a world leader in government laws to protect employees. According to a recent study by the Organization for Economic Cooperation and Development (OECD), the U.S. is the only one of 41 countries that does not provide mandated paid leave for new parents, and among the 40 countries that do mandate paid leave, the minimum duration is about two months. Many European workers receive six weeks or more of paid vacation per year. In the United States, vacations are often one to three weeks per year. If European countries accused the United States of using unfair labor standards to make U.S. products cheaply, and announced that they would shut out all U.S. imports until the United States adopted paid parental leave, added more national holidays, and doubled vacation time, Americans would be outraged. Yet when U.S. protectionists start talking about restricting imports from poor countries because of low wage levels and poor working conditions, they are making a very similar argument. This is not to say that labor conditions in low-income countries are not an important issue. They are. However, linking labor conditions in low-income countries to trade deflects the emphasis from the real question to ask: "What are acceptable and enforceable minimum labor standards and protections to have the world over?"

34.3 Arguments in Support of Restricting Imports

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Explain and analyze various arguments that are in support of restricting imports, including the infant industry argument, the anti-dumping argument, the environmental protection argument, the unsafe consumer products argument, and the national interest argument
- Explain dumping and race to the bottom
- Evaluate the significance of countries' perceptions on the benefits of growing trade

As we previously noted, protectionism requires domestic consumers of a product to pay higher prices to benefit domestic producers of that product. Countries that institute protectionist policies lose the economic gains achieved through a combination of comparative advantage, specialized learning, and economies of scale. With these overall costs in mind, let us now consider, one by one, a number of arguments that support restricting imports.

The Infant Industry Argument

Imagine Bhutan wants to start its own computer industry, but it has no computer firms that can produce at a low enough price and high enough quality to compete in world markets. However, Bhutanese politicians, business leaders, and workers hope that if the local industry had a chance to get established, before it needed to face international competition, then a domestic company or group of companies could develop the skills, management, technology, and economies of scale that it needs to become a successful profit-earning domestic industry. Thus, the infant industry argument for protectionism is to block imports for a limited time, to give the infant industry time to mature, before it starts competing on equal terms in the global economy. (Revisit Macroeconomic Policy Around the World for more information on the infant industry argument.)

The infant industry argument is theoretically possible, even sensible: give an industry a short-term indirect subsidy through protection, and then reap the long-term economic benefits of having a vibrant, healthy industry. Implementation, however, is tricky. In many countries, infant industries have gone from babyhood to senility and obsolescence without ever having reached the profitable maturity stage. Meanwhile, the protectionism that was supposed to be short-term often took a very long time to be repealed.

As one example, Brazil treated its computer industry as an infant industry from the late 1970s until about 1990. In an attempt to establish its computer industry in the global economy, Brazil largely barred imports of computer products for several decades. This policy guaranteed increased sales for Brazilian computers. However, by the mid-1980s, due to lack of international competition, Brazil had a backward and out-of-date industry, typically lagging behind world standards for price and performance by three to five years—a long time in this fast-moving industry. After more than a decade, during which Brazilian consumers and industries that would have benefited from up-to-date computers paid the costs and Brazil's computer industry never competed effectively on world markets, Brazil phased out its infant industry policy for the computer industry.

Protectionism for infant industries always imposes costs on domestic users of the product, and typically has provided little benefit in the form of stronger, competitive industries. However, several countries in East Asia offer an exception. Japan, Korea, Thailand, and other countries in this region have sometimes provided a package of indirect and direct subsidies targeted at certain industries, including protection from foreign competition and government loans at interest rates below the market equilibrium. In Japan and Korea, for example, subsidies helped get their domestic steel and auto industries up and running.

Why did the infant industry policy of protectionism and other subsidies work fairly well in East Asia? An early 1990 World Bank study offered three guidelines to countries thinking about infant industry protection:

1. Do not hand out protectionism and other subsidies to all industries, but focus on a few industries where your country has a realistic chance to be a world-class producer.
2. Be very hesitant about using protectionism in areas like computers, where many other industries rely on having the best products available, because it is not useful to help one industry by imposing high costs on many other industries.
3. Have clear guidelines for when the infant industry policy will end.

In Korea in the 1970s and 1980s, a common practice was to link protectionism and subsidies to export sales in global markets. If export sales rose, then the infant industry had succeeded and the government could phase out protectionism. If export sales did not rise, then the infant industry policy had failed and the government could phase out protectionism. Either way, the protectionism would be temporary.

Following these rules is easier said than done. Politics often intrudes, both in choosing which industries will receive the benefits of treatment as "infants" and when to phase out import restrictions and other subsidies. Also, if the country's government wishes to impose costs on its citizens so that it can provide subsidies to a few key industries, it has many tools for doing such as direct government payments, loans, targeted tax reductions, and government support of research and development of new technologies. In other words, protectionism is not the only or even the best way to support key industries.

LINK IT UP

Visit this website (http://openstax.org/l/integration) to view a presentation by Pankaj Ghemawat questioning how integrated the world really is.

The Anti-Dumping Argument

Dumping refers to selling goods below their cost of production. **Anti-dumping laws** block imports that are sold below the cost of production by imposing tariffs that increase the price of these imports to reflect their cost of production. Since dumping is not allowed under World Trade Organization (WTO) rules, nations that believe they are on the receiving end of dumped goods can file a complaint with the WTO. According to the WTO, between 1995 and 2020, it oversaw 137 anti-dumping disputes. Note that dumping cases are countercyclical. During recessions, case filings increase. During economic booms, case filings go down. Individual countries have also frequently started their own anti-dumping investigations. The U.S. government has dozens of anti-dumping orders in place from past investigations. In 2022, for example, some U.S. imports that were under anti-dumping orders included olives from Spain, steel from South Korea, coated paper from Indonesia, light commercial vehicles from Germany and Italy, fish fillets from Vietnam, and cellulose pulp from Canada.

Why Might Dumping Occur?

Why would foreign firms export a product at less than its cost of production—which presumably means taking a loss? This question has two possible answers, one innocent and one more sinister.

The innocent explanation is that demand and supply set market prices, not the cost of production. Perhaps demand for a product shifts back to the left or supply shifts out to the right, which drives the market price to low levels—even below the cost of production. When a local store has a going-out-of-business sale, for example, it may sell goods at below the cost of production. If international companies find that there is excess supply of steel or computer chips or machine tools that is driving the market price down below their cost of production—this may be the market in action.

The sinister explanation is that dumping is part of a long-term strategy. Foreign firms sell goods at prices below the cost of production for a short period of time, and when they have driven out the domestic U.S. competition, they then raise prices. Economists sometimes call this scenario predatory pricing, which we discuss in the Monopoly chapter.

Should Anti-Dumping Cases Be Limited?

Anti-dumping cases pose two questions. How much sense do they make in economic theory? How much sense do they make as practical policy?

In terms of economic theory, the case for anti-dumping laws is weak. In a market governed by demand and supply, the government does not guarantee that firms will be able to make a profit. After all, low prices are difficult for producers, but benefit consumers. Moreover, although there are plenty of cases in which foreign producers have driven out domestic firms, there are zero documented cases in which the foreign producers then jacked up prices. Instead, foreign producers typically continue competing hard against each other and providing low prices to consumers. In short, it is difficult to find evidence of predatory pricing by foreign firms exporting to the United States.

Even if one could make a case that the government should sometimes enact anti-dumping rules in the short term, and then allow free trade to resume shortly thereafter, there is a growing concern that anti-dumping investigations often involve more politics than careful analysis. The U.S. Commerce Department is charged with calculating the appropriate “cost of production,” which can be as much an art as a science.

For example, if a company built a new factory two years ago, should it count part of the factory’s cost in this

year's cost of production? When a company is in a country where the government controls prices, like China for example, how can one measure the true cost of production? When a domestic industry complains loudly enough, government regulators seem very likely to find that unfair dumping has occurred. A common pattern has arisen where a domestic industry files an anti-dumping complaint, the governments meet and negotiate a reduction in imports, and then the domestic producers drop the anti-dumping suit. In such cases, anti-dumping cases often appear to be little more than a cover story for imposing tariffs or import quotas.

In the 1980s, the United States, Canada, the European Union, Australia, and New Zealand implemented almost all the anti-dumping cases. By the 2000s, countries like Argentina, Brazil, South Korea, South Africa, Mexico, and India were filing the majority of the anti-dumping cases before the WTO. As the number of anti-dumping cases has increased, and as countries such as the United States and the European Union feel targeted by the anti-dumping actions of others, the WTO may well propose some additional guidelines to limit the reach of anti-dumping laws.

The Environmental Protection Argument

The potential for global trade to affect the environment has become controversial. A president of the Sierra Club, an environmental lobbying organization, once wrote: "The consequences of globalization for the environment are not good. … Globalization, if we are lucky, will raise average incomes enough to pay for cleaning up some of the mess that we have made. But before we get there, globalization could also destroy enough of the planet's basic biological and physical systems that prospects for life itself will be radically compromised."

If free trade meant the destruction of life itself, then even economists would convert to protectionism! While globalization—and economic activity of all kinds—can pose environmental dangers, it seems quite possible that, with the appropriate safeguards in place, we can minimize the environmental impacts of trade. In some cases, trade may even bring environmental benefits.

In general, high-income countries such as the United States, Canada, Japan, the United Kingdom, and the nations of the European Union have relatively strict environmental standards. In contrast, middle- and low-income countries like Brazil, Nigeria, India, and China have lower environmental standards. The general view of the governments of such countries is that environmental protection is a luxury: as soon as their people have enough to eat, decent healthcare, and longer life expectancies, then they will spend more money on items such as sewage treatment plants, scrubbers to reduce air pollution from factory smokestacks, and national parks to protect wildlife.

This gap in environmental standards between high-income and low-income countries raises two worrisome possibilities in a world of increasing global trade: the "race to the bottom" scenario and the question of how quickly environmental standards will improve in low-income countries.

The Race to the Bottom Scenario

The **race to the bottom** scenario of global environmental degradation runs like this. Profit-seeking multinational companies shift their production from countries with strong environmental standards to countries with weak standards, thus reducing their costs and increasing their profits. Faced with such behavior, countries reduce their environmental standards to attract multinational firms, which, after all, provide jobs and economic clout. As a result, global production becomes concentrated in countries where firms can pollute the most and environmental laws everywhere "race to the bottom."

Although the race-to-the-bottom scenario sounds plausible, it does not appear to describe reality. In fact, the financial incentive for firms to shift production to poor countries to take advantage of their weaker environmental rules does not seem especially powerful. When firms decide where to locate a new factory, they look at many different factors: the costs of labor and financial capital; whether the location is close to a reliable suppliers of the inputs that they need; whether the location is close to customers; the quality of transportation,

communications, and electrical power networks; the level of taxes; and the competence and honesty of the local government. The cost of environmental regulations is a factor, too, but typically environmental costs are no more than 1 to 2% of the costs that a large industrial plant faces. The other factors that determine location are much more important to these companies than trying to skimp on environmental protection costs.

When an international company does choose to build a plant in a low-income country with lax environmental laws, it typically builds a plant similar to those that it operates in high-income countries with stricter environmental standards. Part of the reason for this decision is that designing an industrial plant is a complex and costly task, and so if a plant works well in a high-income country, companies prefer to use the same design everywhere. Also, companies realize that if they create an environmental disaster in a low-income country, it is likely to cost them a substantial amount of money in paying for damages, lost trust, and reduced sales—by building up-to-date plants everywhere they minimize such risks. As a result of these factors, foreign-owned plants in low-income countries often have a better record of compliance with environmental laws than do locally-owned plants.

Pressuring Low-Income Countries for Higher Environmental Standards

In some cases, the issue is not so much whether globalization will pressure low-income countries to reduce their environmental standards, but instead whether the threat of blocking international trade can pressure these countries into adopting stronger standards. For example, restrictions on ivory imports in high-income countries, along with stronger government efforts to catch elephant poachers, have been credited with helping to reduce the illegal poaching of elephants in certain African countries.

However, it would be highly undemocratic for the well-fed citizens of high-income countries to attempt to dictate to the ill-fed citizens of low-income countries what domestic policies and priorities they must adopt, or how they should balance environmental goals against other priorities for their citizens. Furthermore, if high-income countries want stronger environmental standards in low-income countries, they have many options other than the threat of protectionism. For example, high-income countries could pay for anti-pollution equipment in low-income countries, or could help to pay for national parks. High-income countries could help pay for and carry out the scientific and economic studies that would help environmentalists in low-income countries to make a more persuasive case for the economic benefits of protecting the environment.

After all, environmental protection is vital to two industries of key importance in many low-income countries—agriculture and tourism. Environmental advocates can set up standards for labeling products, like "this tuna caught in a net that kept dolphins safe" or "this product made only with wood not taken from rainforests," so that consumer pressure can reinforce environmentalist values. The United Nations also reinforces these values, by sponsoring treaties to address issues such as climate change and global warming, the preservation of biodiversity, the spread of deserts, and the environmental health of the seabed. Countries that share a national border or are within a region often sign environmental agreements about air and water rights, too. The WTO is also becoming more aware of environmental issues and more careful about ensuring that increases in trade do not inflict environmental damage.

Finally, note that these concerns about the race to the bottom or pressuring low-income countries for more strict environmental standards do not apply very well to the roughly half of all U.S. trade that occurs with other high-income countries. Many European countries have stricter environmental standards in certain industries than the United States.

The Unsafe Consumer Products Argument

One argument for shutting out certain imported products is that they are unsafe for consumers. Consumer rights groups have sometimes warned that the World Trade Organization would require nations to reduce their health and safety standards for imported products. However, the WTO explains its current agreement on the subject in this way: "It allows countries to set their own standards." It also says "regulations must be based on science. . . . And they should not arbitrarily or unjustifiably discriminate between countries where identical or

similar conditions prevail." Thus, for example, under WTO rules it is perfectly legitimate for the United States to pass laws requiring that *all* food products or cars sold in the United States meet certain safety standards approved by the United States government, whether or not other countries choose to pass similar standards. However, such standards must have some scientific basis. It is improper to impose one set of health and safety standards for domestically produced goods but a different set of standards for imports, or one set of standards for imports from Europe and a different set of standards for imports from Latin America.

In 2007, Mattel recalled nearly two million toys imported from China due to concerns about high levels of lead in the paint, as well as some loose parts. It is unclear if other toys were subject to similar standards. In 2013, Japan blocked imports of U.S. wheat because of concerns that genetically modified (GMO) wheat might be included in the shipments. The science on the impact of GMOs on health is still developing.

The National Interest Argument

Some argue that a nation should not depend too heavily on other countries for supplies of certain key products, such as oil, or for special materials or technologies that might have national security applications. On closer consideration, this argument for protectionism proves rather weak.

As an example, in the United States, oil provides about 36% of all the energy and 21% of the oil used in the United States economy is imported. Several times in the last few decades, when disruptions in the Middle East have shifted the supply curve of oil back to the left and sharply raised the price, the effects have been felt across the United States economy. This is not, however, a very convincing argument for restricting oil imports. If the United States needs to be protected from a possible cutoff of foreign oil, then a more reasonable strategy would be to import 100% of the petroleum supply now, and save U.S. domestic oil resources for when or if the foreign supply is cut off. It might also be useful to import extra oil and put it into a stockpile for use in an emergency, as the United States government did by starting a Strategic Petroleum Reserve in 1977. Moreover, it may be necessary to discourage people from using oil, and to start a high-powered program to seek out alternatives to oil. A straightforward way to do this would be to raise taxes on oil. Additionally, it makes no sense to argue that because oil is highly important to the United States economy, then the United States should shut out oil imports and use up its domestic supplies more quickly. U.S. domestic oil production is increasing. Shale oil is adding to domestic supply using fracking extraction techniques.

Whether or not to limit certain kinds of imports of key technologies or materials that might be important to national security and weapons systems is a slightly different issue. If weapons' builders are not confident that they can continue to obtain a key product in wartime, they might decide to avoid designing weapons that use this key product, or they can go ahead and design the weapons and stockpile enough of the key high-tech components or materials to last through an armed conflict. There is a U.S. Defense National Stockpile Center that has built up reserves of many materials, from aluminum oxides, antimony, and bauxite to tungsten, vegetable tannin extracts, and zinc (although many of these stockpiles have been reduced and sold in recent years). Think every country is pro-trade? How about the U.S.? The following Clear It Up might surprise you.

CLEAR IT UP

How does the United States really feel about expanding trade?

How do people around the world feel about expanding trade between nations? In summer 2007, the Pew Foundation surveyed 45,000 people in 47 countries. One of the questions asked about opinions on growing trade ties between countries. Table 34.3 shows the percentages who answered either "very good" or "somewhat good" for some of countries surveyed.

For those who think of the United States as the world's leading supporter of expanding trade, the survey results may be perplexing. When adding up the shares of those who say that growing trade ties between countries is "very good" or "somewhat good," Americans had the least favorable attitude toward increasing globalization, while the Chinese

and South Africans ranked highest. In fact, among the 47 countries surveyed, the United States ranked by far the lowest on this measure, followed by Egypt, Italy, and Argentina.

Country	Very Good	Somewhat Good	Total
China	38%	53%	91%
South Africa	42%	43%	87%
South Korea	24%	62%	86%
Germany	30%	55%	85%
Canada	29%	53%	82%
United Kingdom	28%	50%	78%
Mexico	22%	55%	77%
Brazil	13%	59%	72%
Japan	17%	55%	72%
United States	14%	45%	59%

TABLE 34.3 The Status of Growing Trade Ties between Countries (Source: http://www.pewglobal.org/files/pdf/258.pdf)

One final reason why economists often treat the **national interest argument** skeptically is that lobbyists and politicians can tout almost any product as vital to national security. In 1954, the United States became worried that it was importing half of the wool required for military uniforms, so it declared wool and mohair to be "strategic materials" and began to give subsidies to wool and mohair farmers. Although the government removed wool from the official list of "strategic" materials in 1960, the subsidies for mohair continued for almost 40 years until the government repealed them in 1993, and then reinstated them in 2002. All too often, the national interest argument has become an excuse for handing out the indirect subsidy of protectionism to certain industries or companies. After all, politicians, not nonpartisan analysts make decisions about what constitutes a key strategic material.

34.4 How Governments Enact Trade Policy: Globally, Regionally, and Nationally

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Explain the origin and role of the World Trade Organization (WTO) and General Agreement on Tariffs and Trade (GATT)
- Discuss the significance and provide examples of regional trading agreements
- Analyze trade policy at the national level
- Evaluate long-term trends in barriers to trade

These public policy arguments about how nations should react to globalization and trade are fought out at several levels: at the global level through the World Trade Organization and through regional trade agreements between pairs or groups of countries.

The World Trade Organization

The World Trade Organization (WTO) was officially born in 1995, but its history is much longer. In the years after the Great Depression and World War II, there was a worldwide push to build institutions that would tie the nations of the world together. The United Nations officially came into existence in 1945. The World Bank, which assists the poorest people in the world, and the International Monetary Fund, which addresses issues raised by international financial transactions, were both created in 1946. The third planned organization was to be an International Trade Organization, which would manage international trade. The United Nations was unable to agree to this. Instead, 27 nations signed the **General Agreement on Tariffs and Trade (GATT)** in Geneva, Switzerland on October 30, 1947 to provide a forum in which nations could come together to negotiate reductions in tariffs and other barriers to trade. In 1995, the GATT transformed into the WTO.

The GATT process was to negotiate an agreement to reduce barriers to trade, sign that agreement, pause for a while, and then start negotiating the next agreement. Table 34.4 shows rounds of talks in the GATT, and now the WTO. Notice that the early rounds of GATT talks took a relatively short time, included a small number of countries, and focused almost entirely on reducing tariffs. Since the mid-1960s, however, rounds of trade talks have taken years, included a large number of countries, and have included an ever-broadening range of issues.

Year	Place or Name of Round	Main Subjects	Number of Countries Involved
1947	Geneva	Tariff reduction	23
1949	Annecy	Tariff reduction	13
1951	Torquay	Tariff reduction	38
1956	Geneva	Tariff reduction	26
1960–61	Dillon round	Tariff reduction	26
1964–67	Kennedy round	Tariffs, anti-dumping measures	62
1973–79	Tokyo round	Tariffs, nontariff barriers	102
1986–94	Uruguay round	Tariffs, nontariff barriers, services, intellectual property, dispute settlement, textiles, agriculture, creation of WTO	123
2001–	Doha round	Agriculture, services, intellectual property, competition, investment, environment, dispute settlement	147

TABLE 34.4 The Negotiating Rounds of GATT and the World Trade Organization

The sluggish pace of GATT negotiations led to an old joke that GATT really stood for Gentleman's Agreement to Talk and Talk. The slow pace of international trade talks, however, is understandable, even sensible. Having dozens of nations agree to any treaty is a lengthy process. GATT often set up separate trading rules for certain industries, like agriculture, and separate trading rules for certain countries, like the low-income countries. There were rules, exceptions to rules, opportunities to opt out of rules, and precise wording to be fought over in every case. Like the GATT before it, the WTO is not a world government, with power to impose its decisions on others. The total staff of the WTO Secretariat in 2021 is 625 people and its annual budget (as of 2020) is $197 million, which makes it smaller in size than many large universities.

Regional Trading Agreements

There are different types of economic integration across the globe, ranging from **free trade agreements**, in which participants allow each other's imports without tariffs or quotas, to **common markets**, in which participants have a common external trade policy as well as free trade within the group, to full **economic unions**, in which, in addition to a common market, monetary and fiscal policies are coordinated. Many nations belong both to the World Trade Organization and to regional trading agreements.

The best known of these regional trading agreements is the European Union. In the years after World War II, leaders of several European nations reasoned that if they could tie their economies together more closely, they might be more likely to avoid another devastating war. Their efforts began with a free trade association, evolved into a common market, and then transformed into what is now a full economic union, known as the European Union. The EU, as it is often called, has a number of goals. For example, in the early 2000s it introduced a common currency for Europe, the euro, and phased out most of the former national forms of money like the German mark and the French franc, though a few have retained their own currency. Another key element of the union is to eliminate barriers to the mobility of goods, labor, and capital across Europe. In 2016, Britain voted to leave the European Union—a move that was completed in January 2020.

For the United States, perhaps the best-known regional trading agreement is the North American Free Trade Agreement (NAFTA). [2] The United States also participates in some less-prominent regional trading agreements, like the Caribbean Basin Initiative, which offers reduced tariffs for imports from these countries, and a free trade agreement with Israel.

The world has seen a flood of regional trading agreements in recent years. About 100 such agreements are now in place. Table 34.5 lists a few of the more prominent ones. Some are just agreements to continue talking. Others set specific goals for reducing tariffs, import quotas, and nontariff barriers. One economist described the current trade treaties as a "spaghetti bowl," which is what a map with lines connecting all the countries with trade treaties looks like.

There is concern among economists who favor free trade that some of these regional agreements may promise free trade, but actually act as a way for the countries within the regional agreement to try to limit trade from anywhere else. In some cases, the regional trade agreements may even conflict with the broader agreements of the World Trade Organization.

Trade Agreements	Participating Countries
Asia Pacific Economic Cooperation (APEC)	Australia, Brunei, Canada, Chile, People's Republic of China, Hong Kong, China, Indonesia, Japan, Republic of Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, Philippines, Russia, Singapore, Chinese Taipei, Thailand, United States, Vietnam
European Union (EU)	Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom*

TABLE 34.5 Some Regional Trade Agreements * Following the 2016 referendum vote to leave the European Union, the UK government triggered the withdrawal process on March 29, 2017, setting the date for the UK to leave by April 2019. In January 2020, the withdrawal was complete and the United Kingdom is now no longer part of the EU trading bloc. Also, as of 2020, NAFTA has been replaced by the United States-Mexico-Canada (USMCA) free trade agreement.

2 As of July 1, 2020, NAFTA was officially replaced with the United States-Mexico-Canada (USMCA) free trade agreement. It is broadly similar to the original NAFTA.

Trade Agreements	Participating Countries
North America Free Trade Agreement (NAFTA)	Canada, Mexico, United States
Latin American Integration Association (LAIA)	Argentina, Bolivia, Brazil, Chile, Columbia, Ecuador, Mexico, Paraguay, Peru, Uruguay, Venezuela, Panama
Association of Southeast Asian Nations (ASEAN)	Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam
Southern African Development Community (SADC)	Angola, Botswana, Comoros, Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe

TABLE 34.5 Some Regional Trade Agreements * Following the 2016 referendum vote to leave the European Union, the UK government triggered the withdrawal process on March 29, 2017, setting the date for the UK to leave by April 2019. In January 2020, the withdrawal was complete and the United Kingdom is now no longer part of the EU trading bloc. Also, as of 2020, NAFTA has been replaced by the United States-Mexico-Canada (USMCA) free trade agreement.

Trade Policy at the National Level

Yet another dimension of trade policy, along with international and regional trade agreements, happens at the national level. The United States, for example, imposes import quotas on sugar, because of a fear that such imports would drive down the price of sugar and thus injure domestic sugar producers. One of the jobs of the United States Department of Commerce is to determine if there is import dumping from other countries. The United States International Trade Commission—a government agency—determines whether the dumping has substantially injured domestic industries, and if so, the president can impose tariffs that are intended to offset the unfairly low price.

In the arena of trade policy, the battle often seems to be between national laws that increase protectionism and international agreements that try to reduce protectionism, like the WTO. Why would a country pass laws or negotiate agreements to shut out certain foreign products, like sugar or textiles, while simultaneously negotiating to reduce trade barriers in general? One plausible answer is that international trade agreements offer a method for countries to restrain their own special interests. A member of Congress can say to an industry lobbying for tariffs or quotas on imports: "Sure would like to help you, but that pesky WTO agreement just won't let me."

LINK IT UP

If consumers are the biggest losers from trade, why do they not fight back? The quick answer is because it is easier to organize a small group of people around a narrow interest (producers) versus a large group that has diffuse interests (consumers). This is a question about trade policy theory. Visit this website (http://openstax.org/l/tradepolicy) and read the article by Jonathan Rauch.

Long-Term Trends in Barriers to Trade

In newspaper headlines, trade policy appears mostly as disputes and acrimony. Countries are almost constantly threatening to challenge other nations' "unfair" trading practices. Cases are brought to the dispute settlement procedures of the WTO, the European Union, NAFTA, and other regional trading agreements. Politicians in national legislatures, goaded on by lobbyists, often threaten to pass bills that will "establish a fair playing field" or "prevent unfair trade"—although most such bills seek to accomplish these high-sounding goals by placing more restrictions on trade. Protesters in the streets may object to specific trade rules or to the entire practice of international trade.

Through all the controversy, the general trend in the last 60 years is clearly toward lower barriers to trade. The average level of tariffs on imported products charged by industrialized countries was 40% in 1946. By 1990, after decades of GATT negotiations, it was down to less than 5%. One of the reasons that GATT negotiations shifted from focusing on tariff reduction in the early rounds to a broader agenda was that tariffs had been reduced so dramatically there was not much more to do in that area. U.S. tariffs have followed this general pattern: After rising sharply during the Great Depression, tariffs dropped off to less than 2% by the end of the century. Although measures of import quotas and nontariff barriers are less exact than those for tariffs, they generally appear to be at lower levels than they had been previously, too.

Thus, the last half-century has seen both a dramatic reduction in government-created barriers to trade, such as tariffs, import quotas, and nontariff barriers, and also a number of technological developments that have made international trade easier, like advances in transportation, communication, and information management. The result has been the powerful surge of international trade.

These trends were altered by two important events in 2016: the UK vote to leave the EU and the election of President Trump in the United States, whose administration pursued a policy of raising trade barriers. In 2018, tariffs on a broad range of imports from China were raised by around 25%. As of 2022, the UK has been out of the EU for two years, and it remains unclear if President Biden's administration will adjust or remove President Trump's trade barriers.

34.5 The Tradeoffs of Trade Policy

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Asses the complexity of international trade
- Discuss why a market-oriented economy is so affected by international trade
- Explain disruptive market change

Economists readily acknowledge that international trade is not all sunshine, roses, and happy endings. Over time, the average person gains from international trade, both as a worker who has greater productivity and higher wages because of the benefits of specialization and comparative advantage, and as a consumer who can benefit from shopping all over the world for a greater variety of quality products at attractive prices. The "average person," however, is hypothetical, not real—representing a mix of those who have done very well, those who have done all right, and those who have done poorly. It is a legitimate concern of public policy to focus not just on the average or on the success stories, but also on those who have not been so fortunate. Workers in other countries, the environment, and prospects for new industries and materials that might be of key importance to the national economy are also all legitimate issues.

The common belief among economists is that it is better to embrace the gains from trade, and then deal with the costs and tradeoffs with other policy tools, than it is to cut off trade to avoid the costs and tradeoffs.

To gain a better intuitive understanding for this argument, consider a hypothetical American company called Technotron. Technotron invents a new scientific technology that allows the firm to increase the output and quality of its goods with a smaller number of workers at a lower cost. As a result of this technology, other U.S.

firms in this industry will lose money and will also have to lay off workers—and some of the competing firms will even go bankrupt. Should the United States government protect the existing firms and their employees by making it illegal for Technotron to use its new technology? Most people who live in market-oriented economies would oppose trying to block better products that lower the cost of services. Certainly, there is a case for society providing temporary support and assistance for those who find themselves without work. Many would argue for government support of programs that encourage retraining and acquiring additional skills. Government might also support research and development efforts, so that other firms may find ways of outdoing Technotron. Blocking the new technology altogether, however, seems like a mistake. After all, few people would advocate giving up electricity because it caused so much disruption to the kerosene and candle business. Few would suggest holding back on improvements in medical technology because they might cause companies selling leeches and snake oil to lose money. In short, most people view disruptions due to technological change as a necessary cost that is worth bearing.

Now, imagine that Technotron's new "technology" is as simple as this: the company imports what it sells from another country. In other words, think of foreign trade as a type of innovative technology. The objective situation is now exactly the same as before. Because of Technotron's new technology—which in this case is importing goods from another county—other firms in this industry will lose money and lay off workers. Just as it would have been inappropriate and ultimately foolish to respond to the disruptions of new scientific technology by trying to shut it down, it would be inappropriate and ultimately foolish to respond to the disruptions of international trade by trying to restrict trade.

Some workers and firms will suffer because of international trade. In a living, breathing market-oriented economy, some workers and firms will always be experiencing disruptions, for a wide variety of reasons. Corporate management can be better or worse. Workers for a certain firm can be more or less productive. Tough domestic competitors can create just as much disruption as tough foreign competitors. Sometimes a new product is a hit with consumers; sometimes it is a flop. Sometimes a company is blessed by a run of good luck or stricken with a run of bad luck. For some firms, international trade will offer great opportunities for expanding productivity and jobs; for other firms, trade will impose stress and pain. The disruption caused by international trade is not fundamentally different from all the other disruptions caused by the other workings of a market economy.

In other words, the economic analysis of free trade does not rely on a belief that foreign trade is not disruptive or does not pose tradeoffs; indeed, the story of Technotron begins with a particular **disruptive market change**—a new technology—that causes real tradeoffs. In thinking about the disruptions of foreign trade, or any of the other possible costs and tradeoffs of foreign trade discussed in this chapter, the best public policy solutions typically do not involve protectionism, but instead involve finding ways for public policy to address the particular issues resulting from these disruptions, costs, and tradeoffs, while still allowing the benefits of international trade to occur.

BRING IT HOME

What's the Downside of Protection?

The domestic flat-panel display industry employed many workers before the ITC imposed the dumping margin tax. Flat-panel displays make up a significant portion of the cost of producing laptop computers—as much as 50%. Therefore, the antidumping tax would substantially increase the cost, and thus the price, of U.S.-manufactured laptops. As a result of the ITC's decision, Apple moved its domestic manufacturing plant for Macintosh computers to Ireland (where it had an existing plant). Toshiba shut down its U.S. manufacturing plant for laptops. And IBM cancelled plans to open a laptop manufacturing plant in North Carolina, instead deciding to expand production at its plant in Japan. In this case, rather than having the desired effect of protecting U.S. interests and giving domestic manufacturing an advantage over items manufactured elsewhere, it had the unintended effect of driving the

manufacturing completely out of the country. Many people lost their jobs and most flat-panel display production now occurs in countries other than the United States.

Key Terms

anti-dumping laws laws that block imports sold below the cost of production and impose tariffs that would increase the price of these imports to reflect their cost of production

common market economic agreement between countries to allow free trade in goods, services, labor, and financial capital between members while having a common external trade policy

disruptive market change innovative new product or production technology which disrupts the status quo in a market, leading the innovators to earn more income and profits and the other firms to lose income and profits, unless they can come up with their own innovations

dumping selling internationally traded goods below their cost of production

economic union economic agreement between countries to allow free trade between members, a common external trade policy, and coordinated monetary and fiscal policies

free trade agreement economic agreement between countries to allow free trade between members

General Agreement on Tariffs and Trade (GATT) forum in which nations could come together to negotiate reductions in tariffs and other barriers to trade; the precursor to the World Trade Organization

import quotas numerical limits on the quantity of products that a country can import

national interest argument the argument that there are compelling national interests against depending on key imports from other nations

nontariff barriers ways a nation can draw up rules, regulations, inspections, and paperwork to make it more costly or difficult to import products

protectionism government policies to reduce or block imports

race to the bottom when production locates in countries with the lowest environmental (or other) standards, putting pressure on all countries to reduce their environmental standards

World Trade Organization (WTO) organization that seeks to negotiate reductions in barriers to trade and to adjudicate complaints about violations of international trade policy; successor to the General Agreement on Tariffs and Trade (GATT)

Key Concepts and Summary

34.1 Protectionism: An Indirect Subsidy from Consumers to Producers

There are three tools for restricting the flow of trade: tariffs, import quotas, and nontariff barriers. When a country places limitations on imports from abroad, regardless of whether it uses tariffs, quotas, or nontariff barriers, it is said to be practicing protectionism. Protectionism will raise the price of the protected good in the domestic market, which causes domestic consumers to pay more, but domestic producers to earn more.

34.2 International Trade and Its Effects on Jobs, Wages, and Working Conditions

As international trade increases, it contributes to a shift in jobs away from industries where that economy does not have a comparative advantage and toward industries where it does have a comparative advantage. The degree to which trade affects labor markets has much to do with the structure of the labor market in that country and the adjustment process in other industries. Global trade should raise the average level of wages by increasing productivity. However, this increase in average wages may include both gains to workers in certain jobs and industries and losses to others.

In thinking about labor practices in low-income countries, it is useful to draw a line between what is unpleasant to think about and what is morally objectionable. For example, low wages and long working hours in poor countries are unpleasant to think about, but for people in low-income parts of the world, it may well be the best option open to them. Practices like child labor and forced labor are morally objectionable and many countries refuse to import products made using these practices.

34.3 Arguments in Support of Restricting Imports

There are a number of arguments that support restricting imports. These arguments are based around

industry and competition, environmental concerns, and issues of safety and security.

The infant industry argument for protectionism is that small domestic industries need to be temporarily nurtured and protected from foreign competition for a time so that they can grow into strong competitors. In some cases, notably in East Asia, this approach has worked. Often, however, the infant industries never grow up. On the other hand, arguments against dumping (which is setting prices below the cost of production to drive competitors out of the market), often simply seem to be a convenient excuse for imposing protectionism.

Low-income countries typically have lower environmental standards than high-income countries because they are more worried about immediate basics such as food, education, and healthcare. However, except for a small number of extreme cases, shutting off trade seems unlikely to be an effective method of pursuing a cleaner environment.

Finally, there are arguments involving safety and security. Under the rules of the World Trade Organization, countries are allowed to set whatever standards for product safety they wish, but the standards must be the same for domestic products as for imported products and there must be a scientific basis for the standard. The national interest argument for protectionism holds that it is unwise to import certain key products because if the nation becomes dependent on key imported supplies, it could be vulnerable to a cutoff. However, it is often wiser to stockpile resources and to use foreign supplies when available, rather than preemptively restricting foreign supplies so as not to become dependent on them.

34.4 How Governments Enact Trade Policy: Globally, Regionally, and Nationally

Governments determine trade policy at many different levels: administrative agencies within government, laws passed by the legislature, regional negotiations between a small group of nations (sometimes just two), and global negotiations through the World Trade Organization. During the second half of the twentieth century, trade barriers have, in general, declined quite substantially in the United States economy and in the global economy. One reason why countries sign international trade agreements to commit themselves to free trade is to give themselves protection against their own special interests. When an industry lobbies for protection from foreign producers, politicians can point out that, because of the trade treaty, their hands are tied.

34.5 The Tradeoffs of Trade Policy

International trade certainly has income distribution effects. This is hardly surprising. All domestic or international competitive market forces are disruptive. They cause companies and industries to rise and fall. Government has a role to play in cushioning workers against the disruptions of the market. However, just as it would be unwise in the long term to clamp down on new technology and other causes of disruption in domestic markets, it would be unwise to clamp down on foreign trade. In both cases, the disruption brings with it economic benefits.

Self-Check Questions

1. Explain how a tariff reduction causes an increase in the equilibrium quantity of imports and a decrease in the equilibrium price. *Hint:* Consider the Work It Out "Effects of Trade Barriers."
2. Explain how a subsidy on agricultural goods like sugar adversely affects the income of foreign producers of imported sugar.
3. Explain how trade barriers save jobs in protected industries, but only by costing jobs in other industries.
4. Explain how trade barriers raise wages in protected industries by reducing average wages economy-wide.
5. How does international trade affect working conditions of low-income countries?
6. Do the jobs for workers in low-income countries that involve making products for export to high-income countries typically pay these workers more or less than their next-best alternative?
7. How do trade barriers affect the average income level in an economy?

8. How does the cost of "saving" jobs in protected industries compare to the workers' wages and salaries?
9. Explain how predatory pricing could be a motivation for dumping.
10. Why do low-income countries like Brazil, Egypt, or Vietnam have lower environmental standards than high-income countries like the Germany, Japan, or the United States?
11. Explain the logic behind the "race to the bottom" argument and the likely reason it has not occurred.
12. What are the conditions under which a country may use the unsafe products argument to block imports?
13. Why is the national security argument not convincing?
14. Assume a perfectly competitive market and the exporting country is small. Using a demand and supply diagram, show the impact of increasing standards on a low-income exporter of toys. Show the tariff's impact. Is the effect on toy prices the same or different? Why is a standards policy preferred to tariffs?
15. What is the difference between a free trade association, a common market, and an economic union?
16. Why would countries promote protectionist laws, while also negotiate for freer trade internationally?
17. What might account for the dramatic increase in international trade over the past 50 years?
18. How does competition, whether domestic or foreign, harm businesses?
19. What are the gains from competition?

Review Questions

20. Who does protectionism protect? From what does it protect them?
21. Name and define three policy tools for enacting protectionism.
22. How does protectionism affect the price of the protected good in the domestic market?
23. Does international trade, taken as a whole, increase the total number of jobs, decrease the total number of jobs, or leave the total number of jobs about the same?
24. Is international trade likely to have roughly the same effect on the number of jobs in each individual industry?
25. How is international trade, taken as a whole, likely to affect the average level of wages?
26. Is international trade likely to have about the same effect on everyone's wages?
27. What are main reasons for protecting "infant industries"? Why is it difficult to stop protecting them?
28. What is dumping? Why does prohibiting it often work better in theory than in practice?
29. What is the "race to the bottom" scenario?
30. Do the rules of international trade require that all nations impose the same consumer safety standards?
31. What is the national interest argument for protectionism with regard to certain products?
32. Name several of the international treaties where countries negotiate with each other over trade policy.
33. What is the general trend of trade barriers over recent decades: higher, lower, or about the same?
34. If opening up to free trade would benefit a nation, then why do nations not just eliminate their trade barriers, and not bother with international trade negotiations?
35. Who gains and who loses from trade?
36. Why is trade a good thing if some people lose?

37. What are some ways that governments can help people who lose from trade?

Critical Thinking Questions

38. Show graphically that for any tariff, there is an equivalent quota that would give the same result. What would be the difference, then, between the two types of trade barriers? *Hint*: It is not something you can see from the graph.

39. From the Work It Out "Effects of Trade Barriers," you can see that a tariff raises the price of imports. What is interesting is that the price rises by less than the amount of the tariff. Who pays the rest of the tariff amount? Can you show this graphically?

40. If trade barriers hurt the average worker in an economy (due to lower wages), why does government create trade barriers?

41. Why do you think labor standards and working conditions are lower in the low-income countries of the world than in countries like the United States?

42. How would direct subsidies to key industries be preferable to tariffs or quotas?

43. How can governments identify good candidates for infant industry protection? Can you suggest some key characteristics of good candidates? Why are industries like computers not good candidates for infant industry protection?

44. Microeconomic theory argues that it is economically rationale (and profitable) to sell additional output as long as the price covers the variable costs of production. How is this relevant to the determination of whether dumping has occurred?

45. How do you think Americans would feel if other countries began to urge the United States to increase environmental standards?

46. Is it legitimate to impose higher safety standards on imported goods that exist in the foreign country where the goods were produced?

47. Why might the unsafe consumer products argument be a more effective strategy (from the perspective of the importing country) than using tariffs or quotas to restrict imports?

48. Why might a tax on domestic consumption of resources critical for national security be a more efficient approach than barriers to imports?

49. Why do you think that the GATT rounds and, more recently, WTO negotiations have become longer and more difficult to resolve?

50. An economic union requires giving up some political autonomy to succeed. What are some examples of political power countries must give up to be members of an economic union?

51. What are some examples of innovative products that have disrupted their industries for the better?

52. In principle, the benefits of international trade to a country exceed the costs, no matter whether the country is importing or exporting. In practice, it is not always possible to compensate the losers in a country, for example, workers who lose their jobs due to foreign imports. In your opinion, does that mean that trade should be inhibited to prevent the losses?

53. Economists sometimes say that protectionism is the "second-best" choice for dealing with any particular problem. What they mean is that there is often a policy choice that is more direct or effective for dealing with the problem—a choice that would still allow the benefits of trade to occur. Explain why protectionism is a "second-best" choice for:

a. helping workers as a group
b. helping industries stay strong
c. protecting the environment
d. advancing national defense

54. Trade has income distribution effects. For example, suppose that because of a government-negotiated reduction in trade barriers, trade between Germany and the Czech Republic increases. Germany sells house paint to the Czech Republic. The Czech Republic sells alarm clocks to Germany. Would you expect this pattern of trade to increase or decrease jobs and wages in the paint industry in Germany? The alarm clock industry in Germany? The paint industry in Czech Republic? The alarm clock industry in Czech Republic? What has to happen for there to be no increase in total unemployment in both countries?

Problems

55. Assume two countries, Thailand (T) and Japan (J), have one good: cameras. The demand (d) and supply (s) for cameras in Thailand and Japan is described by the following functions:

$$Qd^T = 60 - P$$

$$Qs^T = -5 + \tfrac{1}{4}P$$

$$Qd^J = 80 - P$$

$$Qs^J = -10 + \tfrac{1}{2}P$$

P is the price measured in a common currency used in both countries, such as the Thai Baht.

a. Compute the equilibrium price (P) and quantities (Q) in each country without trade.
b. Now assume that free trade occurs. The free-trade price goes to 56.36 Baht. Who exports and imports cameras and in what quantities?

56. You have just been put in charge of trade policy for Malawi. Coffee is a recent crop that is growing well and the Malawian export market is developing. As such, Malawi coffee is an infant industry. Malawi coffee producers come to you and ask for tariff protection from cheap Tanzanian coffee. What sorts of policies will you enact? Explain.

57. The country of Pepperland exports steel to the Land of Submarines. Information for the quantity demanded (Qd) and quantity supplied (Qs) in each country, in a world without trade, are given in Table 34.6 and Table 34.7.

Price ($)	Qd	Qs
60	230	180
70	200	200
80	170	220
90	150	240
100	140	250

TABLE 34.6
Pepperland

Price ($)	Qd	Qs
60	430	310
70	420	330
80	410	360
90	400	400
100	390	440

TABLE 34.7 Land of Submarines

a. What would be the equilibrium price and quantity in each country in a world without trade? How can you tell?
b. What would be the equilibrium price and quantity in each country if trade is allowed to occur? How can you tell?
c. Sketch two supply and demand diagrams, one for each country, in the situation before trade.
d. On those diagrams, show the equilibrium price and the levels of exports and imports in the world after trade.
e. If the Land of Submarines imposes an anti-dumping import quota of 30, explain in general terms whether it will benefit or injure consumers and producers in each country.
f. Does your general answer change if the Land of Submarines imposes an import quota of 70?

APPENDIX A

The Use of Mathematics in Principles of Economics

(This appendix should be consulted after first reading Welcome to Economics!) Economics is not math. There is no important concept in this course that cannot be explained without mathematics. That said, math is a tool that can be used to illustrate economic concepts. Remember the saying a picture is worth a thousand words? Instead of a picture, think of a graph. It is the same thing. Economists use models as the primary tool to derive insights about economic issues and problems. Math is one way of working with (or manipulating) economic models.

There are other ways of representing models, such as text or narrative. But why would you use your fist to bang a nail, if you had a hammer? Math has certain advantages over text. It disciplines your thinking by making you specify exactly what you mean. You can get away with fuzzy thinking in your head, but you cannot when you reduce a model to algebraic equations. At the same time, math also has disadvantages. Mathematical models are necessarily based on simplifying assumptions, so they are not likely to be perfectly realistic. Mathematical models also lack the nuances which can be found in narrative models. The point is that math is one tool, but it is not the only tool or even always the best tool economists can use. So what math will you need for this book? The answer is: little more than high school algebra and graphs. You will need to know:

- What a function is
- How to interpret the equation of a line (i.e., slope and intercept)
- How to manipulate a line (i.e., changing the slope or the intercept)
- How to compute and interpret a growth rate (i.e., percentage change)
- How to read and manipulate a graph

In this text, we will use the easiest math possible, and we will introduce it in this appendix. So if you find some math in the book that you cannot follow, come back to this appendix to review. Like most things, math has diminishing returns. A little math ability goes a long way; the more advanced math you bring in, the less additional knowledge that will get you. That said, if you are going to major in economics, you should consider learning a little calculus. It will be worth your while in terms of helping you learn advanced economics more quickly.

Algebraic Models

Often economic models (or parts of models) are expressed in terms of mathematical functions. What is a function? A function describes a relationship. Sometimes the relationship is a definition. For example (using words), your professor is Adam Smith. This could be expressed as Professor = Adam Smith. Or Friends = Bob + Shawn + Margaret.

Often in economics, functions describe cause and effect. The variable on the left-hand side is what is being explained ("the effect"). On the right-hand side is what is doing the explaining ("the causes"). For example, suppose your GPA was determined as follows:

$$\text{GPA} = 0.25 \times \text{combined\_SAT} + 0.25 \times \text{class\_attendance} + 0.50 \times \text{hours\_spent\_studying}$$

This equation states that your GPA depends on three things: your combined SAT score, your class attendance, and the number of hours you spend studying. It also says that study time is twice as important (0.50) as either combined_SAT score (0.25) or class_attendance (0.25). If this relationship is true, how could you raise your GPA? By not skipping class and studying more. Note that you cannot do anything about your SAT score, since if you are in college, you have (presumably) already taken the SATs.

Of course, economic models express relationships using economic variables, like Budget =

money_spent_on_econ_books + money_spent_on_music, assuming that the only things you buy are economics books and music.

Most of the relationships we use in this course are expressed as linear equations of the form:

$$y = b + mx$$

Expressing Equations Graphically

Graphs are useful for two purposes. The first is to express equations visually, and the second is to display statistics or data. This section will discuss expressing equations visually.

To a mathematician or an economist, a variable is the name given to a quantity that may assume a range of values. In the equation of a line presented above, x and y are the variables, with x on the horizontal axis and y on the vertical axis, and b and m representing factors that determine the shape of the line. To see how this equation works, consider a numerical example:

$$y = 9 + 3x$$

In this equation for a specific line, the b term has been set equal to 9 and the m term has been set equal to 3. Table A1 shows the values of x and y for this given equation. Figure A1 shows this equation, and these values, in a graph. To construct the table, just plug in a series of different values for x, and then calculate what value of y results. In the figure, these points are plotted and a line is drawn through them.

x	y
0	9
1	12
2	15
3	18
4	21
5	24
6	27

TABLE A1 Values for the Slope Intercept Equation

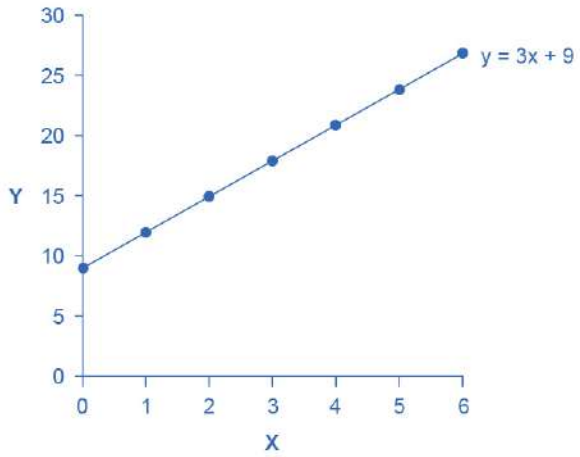


FIGURE A1 Slope and the Algebra of Straight Lines This line graph has *x* on the horizontal axis and y on the vertical axis. The y-intercept—that is, the point where the line intersects the y-axis—is 9. The slope of the line is 3; that is, there is a rise of 3 on the vertical axis for every increase of 1 on the horizontal axis. The slope is the same all along a straight line.

This example illustrates how the b and m terms in an equation for a straight line determine the shape of the line. The b term is called the y-intercept. The reason for this name is that, if x = 0, then the b term will reveal where the line intercepts, or crosses, the y-axis. In this example, the line hits the vertical axis at 9. The m term in the equation for the line is the slope. Remember that slope is defined as rise over run; more specifically, the slope of a line from one point to another is the change in the vertical axis divided by the change in the horizontal axis. In this example, each time the x term increases by one (the run), the y term rises by three. Thus, the slope of this line is three. Specifying a y-intercept and a slope—that is, specifying b and m in the equation for a line—will identify a specific line. Although it is rare for real-world data points to arrange themselves as an exact straight line, it often turns out that a straight line can offer a reasonable approximation of actual data.

Interpreting the Slope

The concept of slope is very useful in economics, because it measures the relationship between two variables. A positive slope means that two variables are positively related; that is, when x increases, so does y, or when x decreases, y decreases also. Graphically, a positive slope means that as a line on the line graph moves from left to right, the line rises. The length-weight relationship, shown in Figure A3 later in this Appendix, has a positive slope. We will learn in other chapters that price and quantity supplied have a positive relationship; that is, firms will supply more when the price is higher.

A negative slope means that two variables are negatively related; that is, when x increases, y decreases, or when x decreases, y increases. Graphically, a negative slope means that, as the line on the line graph moves from left to right, the line falls. The altitude-air density relationship, shown in Figure A4 later in this appendix, has a negative slope. We will learn that price and quantity demanded have a negative relationship; that is, consumers will purchase less when the price is higher.

A slope of zero means that there is no relationship between x and y. Graphically, the line is flat; that is, zero rise over the run. Figure A5 of the unemployment rate, shown later in this appendix, illustrates a common pattern of many line graphs: some segments where the slope is positive, other segments where the slope is negative, and still other segments where the slope is close to zero.

The slope of a straight line between two points can be calculated in numerical terms. To calculate slope, begin by designating one point as the "starting point" and the other point as the "end point" and then calculating the rise over run between these two points. As an example, consider the slope of the air density graph between the

points representing an altitude of 4,000 meters and an altitude of 6,000 meters:

Rise: Change in variable on vertical axis (end point minus original point)

$$= 0.100 - 0.307$$
$$= -0.207$$

Run: Change in variable on horizontal axis (end point minus original point)

$$= 6{,}000 - 4{,}000$$
$$= 2{,}000$$

Thus, the slope of a straight line between these two points would be that from the altitude of 4,000 meters up to 6,000 meters, the density of the air decreases by approximately 0.1 kilograms/cubic meter for each of the next 1,000 meters.

Suppose the slope of a line were to increase. Graphically, that means it would get steeper. Suppose the slope of a line were to decrease. Then it would get flatter. These conditions are true whether or not the slope was positive or negative to begin with. A higher positive slope means a steeper upward tilt to the line, while a smaller positive slope means a flatter upward tilt to the line. A negative slope that is larger in absolute value (that is, more negative) means a steeper downward tilt to the line. A slope of zero is a horizontal flat line. A vertical line has an infinite slope.

Suppose a line has a larger intercept. Graphically, that means it would shift out (or up) from the old origin, parallel to the old line. If a line has a smaller intercept, it would shift in (or down), parallel to the old line.

Solving Models with Algebra

Economists often use models to answer a specific question, like: What will the unemployment rate be if the economy grows at 3% per year? Answering specific questions requires solving the "system" of equations that represent the model.

Suppose the demand for personal pizzas is given by the following equation:

$$Qd = 16 - 2P$$

where Qd is the amount of personal pizzas consumers want to buy (i.e., quantity demanded), and P is the price of pizzas. Suppose the supply of personal pizzas is:

$$Qs = 2 + 5P$$

where Qs is the amount of pizza producers will supply (i.e., quantity supplied).

Finally, suppose that the personal pizza market operates where supply equals demand, or

$$Qd = Qs$$

We now have a system of three equations and three unknowns (Qd, Qs, and P), which we can solve with algebra:

Since Qd = Qs, we can set the demand and supply equation equal to each other:

$$Qd = Qs$$
$$16 - 2P = 2 + 5P$$

Subtracting 2 from both sides and adding 2P to both sides yields:

$$16 - 2P - 2 = 2 + 5P - 2$$
$$14 - 2P = 5P$$
$$14 - 2P + 2P = 5P + 2P$$
$$14 = 7P$$
$$\frac{14}{7} = \frac{7P}{7}$$
$$2 = P$$

In other words, the price of each personal pizza will be $2. How much will consumers buy?

Taking the price of $2, and plugging it into the demand equation, we get:

$$\begin{aligned} Qd &= 16 - 2P \\ &= 16 - 2(2) \\ &= 16 - 4 \\ &= 12 \end{aligned}$$

So if the price is $2 each, consumers will purchase 12. How much will producers supply? Taking the price of $2, and plugging it into the supply equation, we get:

$$\begin{aligned} Qs &= 2 + 5P \\ &= 2 + 5(2) \\ &= 2 + 10 \\ &= 12 \end{aligned}$$

So if the price is $2 each, producers will supply 12 personal pizzas. This means we did our math correctly, since Qd = Qs.

Solving Models with Graphs

If algebra is not your forte, you can get the same answer by using graphs. Take the equations for Qd and Qs and graph them on the same set of axes as shown in Figure A2. Since P is on the vertical axis, it is easiest if you solve each equation for P. The demand curve is then P = 8 – 0.5Qd and the supply curve is P = –0.4 + 0.2Qs. Note that the vertical intercepts are 8 and –0.4, and the slopes are –0.5 for demand and 0.2 for supply. If you draw the graphs carefully, you will see that where they cross (Qs = Qd), the price is $2 and the quantity is 12, just like the algebra predicted.

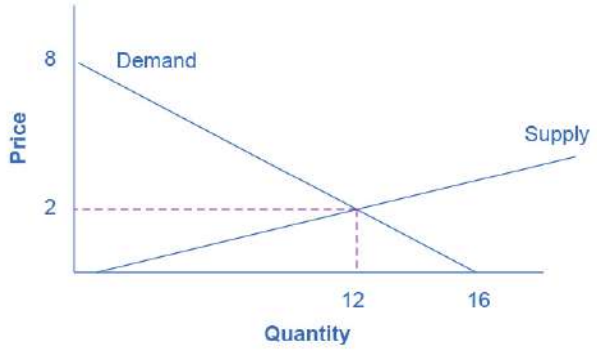


FIGURE A2 Supply and Demand Graph The equations for Qd and Qs are displayed graphically by the sloped lines.

We will use graphs more frequently in this book than algebra, but now you know the math behind the graphs.

Growth Rates

Growth rates are frequently encountered in real world economics. A growth rate is simply the percentage change in some quantity. It could be your income. It could be a business's sales. It could be a nation's GDP. The formula for computing a growth rate is straightforward:

$$\text{Percentage change} = \frac{\text{Change in quantity}}{\text{Quantity}}$$

Suppose your job pays $10 per hour. Your boss, however, is so impressed with your work that he gives you a $2 per hour raise. The percentage change (or growth rate) in your pay is $2/$10 = 0.20 or 20%.

To compute the growth rate for data over an extended period of time, for example, the average annual growth in GDP over a decade or more, the denominator is commonly defined a little differently. In the previous example, we defined the quantity as the initial quantity—or the quantity when we started. This is fine for a one-time calculation, but when we compute the growth over and over, it makes more sense to define the quantity as the average quantity over the period in question, which is defined as the quantity halfway between the initial

quantity and the next quantity. This is harder to explain in words than to show with an example. Suppose a nation's GDP was $1 trillion in 2005 and $1.03 trillion in 2006. The growth rate between 2005 and 2006 would be the change in GDP ($1.03 trillion – $1.00 trillion) divided by the average GDP between 2005 and 2006 ($1.03 trillion + $1.00 trillion)/2. In other words:

$$= \frac{\$1.03 \text{ trillion} - \$1.00 \text{ trillion}}{(\$1.03 \text{ trillion} + \$1.00 \text{ trillion}) / 2}$$
$$= \frac{0.03}{1.015}$$
$$= 0.0296$$
$$= 2.96\% \text{ growth}$$

Note that if we used the first method, the calculation would be ($1.03 trillion – $1.00 trillion) / $1.00 trillion = 3% growth, which is approximately the same as the second, more complicated method. If you need a rough approximation, use the first method. If you need accuracy, use the second method.

A few things to remember: A positive growth rate means the quantity is growing. A smaller growth rate means the quantity is growing more slowly. A larger growth rate means the quantity is growing more quickly. A negative growth rate means the quantity is decreasing.

The same change over times yields a smaller growth rate. If you got a $2 raise each year, in the first year the growth rate would be $2/$10 = 20%, as shown above. But in the second year, the growth rate would be $2/$12 = 0.167 or 16.7% growth. In the third year, the same $2 raise would correspond to a $2/$14 = 14.2%. The moral of the story is this: To keep the growth rate the same, the change must increase each period.

Displaying Data Graphically and Interpreting the Graph

Graphs are also used to display data or evidence. Graphs are a method of presenting numerical patterns. They condense detailed numerical information into a visual form in which relationships and numerical patterns can be seen more easily. For example, which countries have larger or smaller populations? A careful reader could examine a long list of numbers representing the populations of many countries, but with over 200 nations in the world, searching through such a list would take concentration and time. Putting these same numbers on a graph can quickly reveal population patterns. Economists use graphs both for a compact and readable presentation of groups of numbers and for building an intuitive grasp of relationships and connections.

Three types of graphs are used in this book: line graphs, pie graphs, and bar graphs. Each is discussed below. We also provide warnings about how graphs can be manipulated to alter viewers' perceptions of the relationships in the data.

Line Graphs

The graphs we have discussed so far are called line graphs, because they show a relationship between two variables: one measured on the horizontal axis and the other measured on the vertical axis.

Sometimes it is useful to show more than one set of data on the same axes. The data in Table A2 is displayed in Figure A3 which shows the relationship between two variables: length and median weight for American baby boys and girls during the first three years of life. (The median means that half of all babies weigh more than this and half weigh less.) The line graph measures length in inches on the horizontal axis and weight in pounds on the vertical axis. For example, point A on the figure shows that a boy who is 28 inches long will have a median weight of about 19 pounds. One line on the graph shows the length-weight relationship for boys and the other line shows the relationship for girls. This kind of graph is widely used by healthcare providers to check whether a child's physical development is roughly on track.

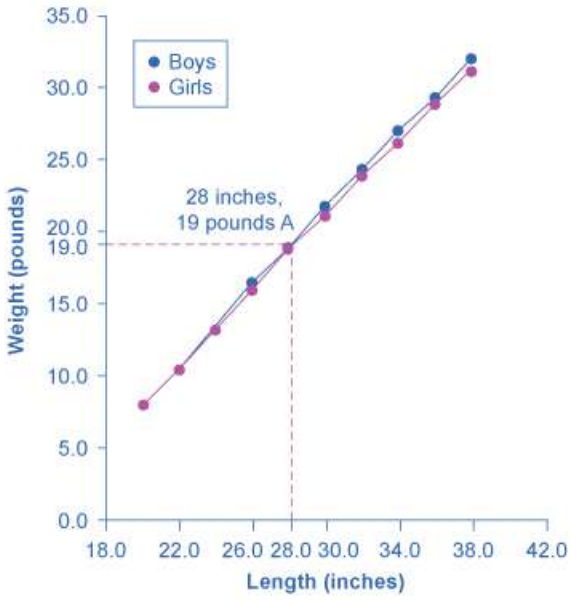


FIGURE A3 The Length-Weight Relationship for American Boys and Girls The line graph shows the relationship between height and weight for boys and girls from birth to 3 years. Point A, for example, shows that a boy of 28 inches in height (measured on the horizontal axis) is typically 19 pounds in weight (measured on the vertical axis). These data apply only to children in the first three years of life.

Boys from Birth to 36 Months		Girls from Birth to 36 Months	
Length (inches)	Weight (pounds)	Length (inches)	Weight (pounds)
20.0	8.0	20.0	7.9
22.0	10.5	22.0	10.5
24.0	13.5	24.0	13.2
26.0	16.4	26.0	16.0
28.0	19.0	28.0	18.8
30.0	21.8	30.0	21.2
32.0	24.3	32.0	24.0
34.0	27.0	34.0	26.2
36.0	29.3	36.0	28.9
38.0	32.0	38.0	31.3

TABLE A2 Length to Weight Relationship for American Boys and Girls

Not all relationships in economics are linear. Sometimes they are curves. Figure A4 presents another example of a line graph, representing the data from Table A3. In this case, the line graph shows how thin the air becomes when you climb a mountain. The horizontal axis of the figure shows altitude, measured in meters above sea level. The vertical axis measures the density of the air at each altitude. Air density is measured by the weight of the air in a cubic meter of space (that is, a box measuring one meter in height, width, and depth).

As the graph shows, air pressure is heaviest at ground level and becomes lighter as you climb. Figure A4 shows that a cubic meter of air at an altitude of 500 meters weighs approximately one kilogram (about 2.2 pounds). However, as the altitude increases, air density decreases. A cubic meter of air at the top of Mount Everest, at about 8,828 meters, would weigh only 0.023 kilograms. The thin air at high altitudes explains why many mountain climbers need to use oxygen tanks as they reach the top of a mountain.

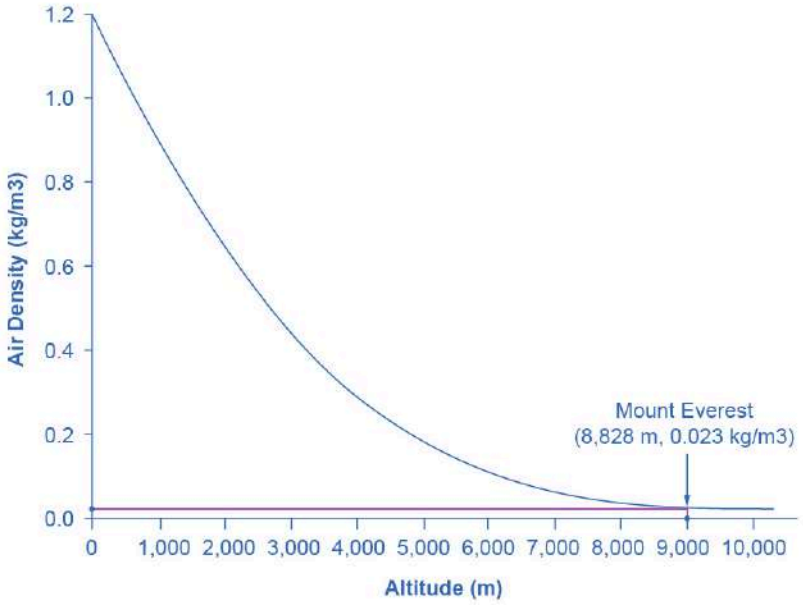


FIGURE A4 Altitude-Air Density Relationship This line graph shows the relationship between altitude, measured in meters above sea level, and air density, measured in kilograms of air per cubic meter. As altitude rises, air density declines. The point at the top of Mount Everest has an altitude of approximately 8,828 meters above sea level (the horizontal axis) and air density of 0.023 kilograms per cubic meter (the vertical axis).

Altitude (meters)	Air Density (kg/cubic meters)
0	1.200
500	1.093
1,000	0.831
1,500	0.678
2,000	0.569
2,500	0.484
3,000	0.415
3,500	0.357
4,000	0.307
4,500	0.231
5,000	0.182

TABLE A3 Altitude to Air Density Relationship

Altitude (meters)	Air Density (kg/cubic meters)
5,500	0.142
6,000	0.100
6,500	0.085
7,000	0.066
7,500	0.051
8,000	0.041
8,500	0.025
9,000	0.022
9,500	0.019
10,000	0.014

TABLE A3 Altitude to Air Density Relationship

The length-weight relationship and the altitude-air density relationships in these two figures represent averages. If you were to collect actual data on air pressure at different altitudes, the same altitude in different geographic locations will have slightly different air density, depending on factors like how far you are from the equator, local weather conditions, and the humidity in the air. Similarly, in measuring the height and weight of children for the previous line graph, children of a particular height would have a range of different weights, some above average and some below. In the real world, this sort of variation in data is common. The task of a researcher is to organize that data in a way that helps to understand typical patterns. The study of statistics, especially when combined with computer statistics and spreadsheet programs, is a great help in organizing this kind of data, plotting line graphs, and looking for typical underlying relationships. For most economics and social science majors, a statistics course will be required at some point.

One common line graph is called a time series, in which the horizontal axis shows time and the vertical axis displays another variable. Thus, a time series graph shows how a variable changes over time. Figure A5 shows the unemployment rate in the United States since 1975, where unemployment is defined as the percentage of adults who want jobs and are looking for a job, but cannot find one. The points for the unemployment rate in each year are plotted on the graph, and a line then connects the points, showing how the unemployment rate has moved up and down since 1975. The line graph makes it easy to see, for example, that the highest unemployment rate during this time period was slightly less than 10% in the early 1980s and 2010, while the unemployment rate declined from the early 1990s to the end of the 1990s, before rising and then falling back in the early 2000s, and then rising sharply during the recession from 2008–2009.

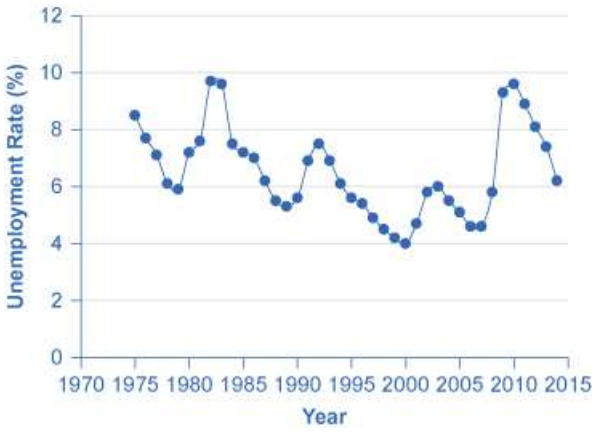


FIGURE A5 U.S. Unemployment Rate, 1975–2014 This graph provides a quick visual summary of unemployment data. With a graph like this, it is easy to spot the times of high unemployment and of low unemployment.

Pie Graphs

A pie graph (sometimes called a pie chart) is used to show how an overall total is divided into parts. A circle represents a group as a whole. The slices of this circular "pie" show the relative sizes of subgroups.

Figure A6 shows how the U.S. population was divided among children, working age adults, and the elderly in 1970, 2000, and what is projected for 2030. The information is first conveyed with numbers in Table A4, and then in three pie charts. The first column of Table A4 shows the total U.S. population for each of the three years. Columns 2–4 categorize the total in terms of age groups—from birth to 18 years, from 19 to 64 years, and 65 years and above. In columns 2–4, the first number shows the actual number of people in each age category, while the number in parentheses shows the percentage of the total population comprised by that age group.

Year	Total Population	19 and Under	20–64 years	Over 65
1970	205.0 million	77.2 (37.6%)	107.7 (52.5%)	20.1 (9.8%)
2000	275.4 million	78.4 (28.5%)	162.2 (58.9%)	34.8 (12.6%)
2030	351.1 million	92.6 (26.4%)	188.2 (53.6%)	70.3 (20.0%)

TABLE A4 U.S. Age Distribution, 1970, 2000, and 2030 (projected)

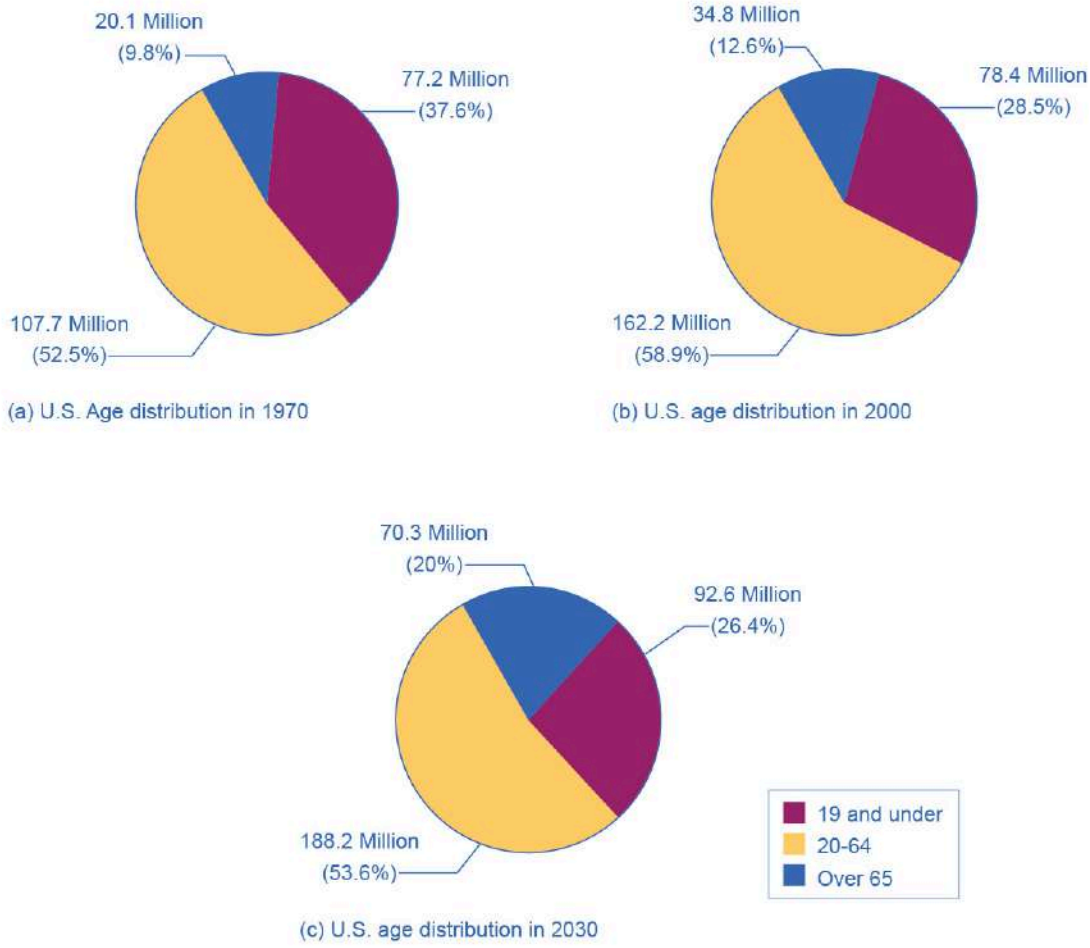


FIGURE A6 Pie Graphs of the U.S. Age Distribution (numbers in millions) The three pie graphs illustrate the division of total population into three age groups for the three different years.

In a pie graph, each slice of the pie represents a share of the total, or a percentage. For example, 50% would be half of the pie and 20% would be one-fifth of the pie. The three pie graphs in Figure A6 show that the share of the U.S. population 65 and over is growing. The pie graphs allow you to get a feel for the relative size of the different age groups from 1970 to 2000 to 2030, without requiring you to slog through the specific numbers and percentages in the table. Some common examples of how pie graphs are used include dividing the population into groups by age, income level, ethnicity, religion, occupation; dividing different firms into categories by size, industry, number of employees; and dividing up government spending or taxes into its main categories.

Bar Graphs

A bar graph uses the height of different bars to compare quantities. Table A5 lists the 12 most populous countries in the world. Figure A7 provides this same data in a bar graph. The height of the bars corresponds to the population of each country. Although you may know that China and India are the most populous countries in the world, seeing how the bars on the graph tower over the other countries helps illustrate the magnitude of the difference between the sizes of national populations.

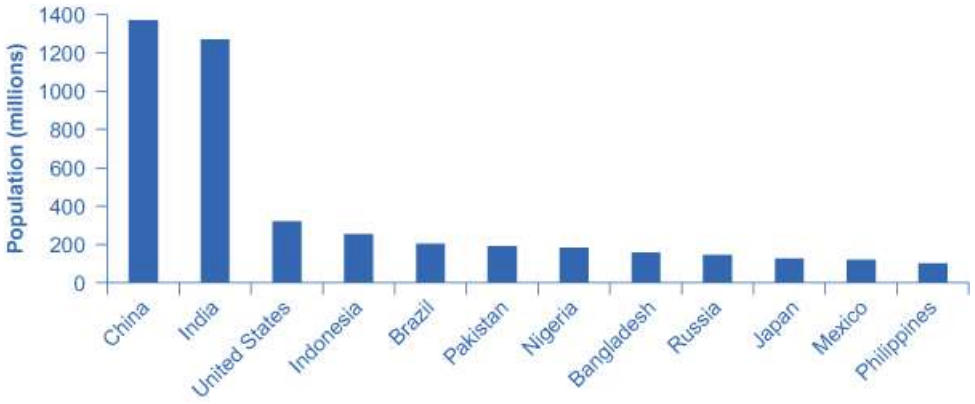


FIGURE A7 Leading Countries of the World by Population, 2015 (in millions) The graph shows the 12 countries of the world with the largest populations. The height of the bars in the bar graph shows the size of the population for each country.

Country	Population
China	1,369
India	1,270
United States	321
Indonesia	255
Brazil	204
Pakistan	190
Nigeria	184
Bangladesh	158
Russia	146
Japan	127
Mexico	121
Philippines	101

TABLE A5 Leading 12 Countries of the World by Population

Bar graphs can be subdivided in a way that reveals information similar to that we can get from pie charts. Figure A8 offers three bar graphs based on the information from Figure A6 about the U.S. age distribution in 1970, 2000, and 2030. Figure A8 (a) shows three bars for each year, representing the total number of persons in each age bracket for each year. Figure A8 (b) shows just one bar for each year, but the different age groups are now shaded inside the bar. In Figure A8 (c), still based on the same data, the vertical axis measures percentages rather than the number of persons. In this case, all three bar graphs are the same height, representing 100% of the population, with each bar divided according to the percentage of population in each age group. It is sometimes easier for a reader to run their eyes across several bar graphs, comparing the

shaded areas, rather than trying to compare several pie graphs.

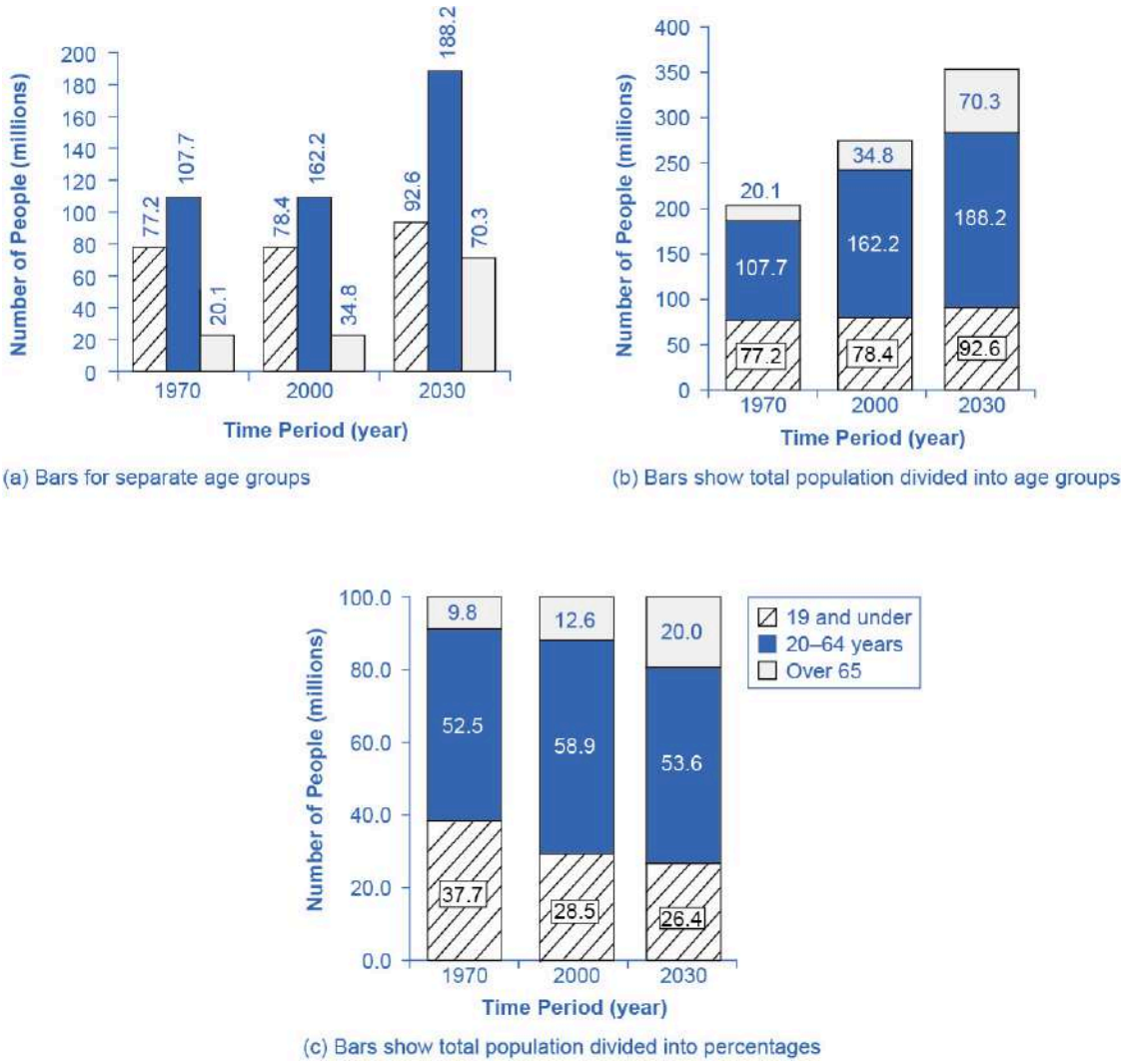


FIGURE A8 U.S. Population with Bar Graphs Population data can be represented in different ways. (a) Shows three bars for each year, representing the total number of persons in each age bracket for each year. (b) Shows just one bar for each year, but the different age groups are now shaded inside the bar. (c) Sets the vertical axis as a measure of percentages rather than the number of persons. All three bar graphs are the same height and each bar is divided according to the percentage of population in each age group.

Figure A7 and Figure A8 show how the bars can represent countries or years, and how the vertical axis can represent a numerical or a percentage value. Bar graphs can also compare size, quantity, rates, distances, and other quantitative categories.

Comparing Line Graphs with Pie Charts and Bar Graphs

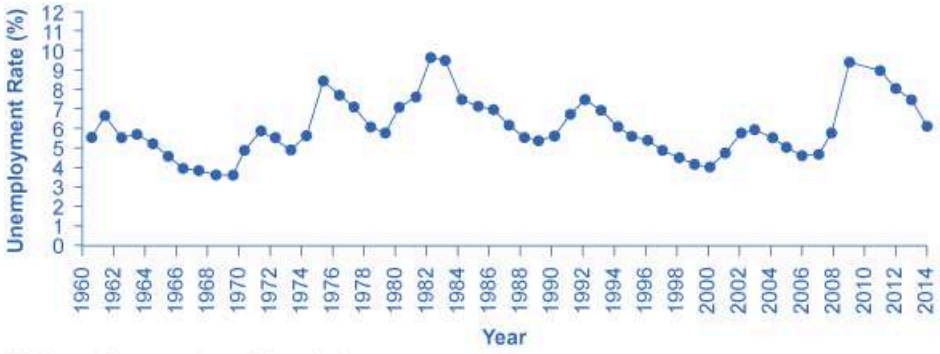
Now that you are familiar with pie graphs, bar graphs, and line graphs, how do you know which graph to use for your data? Pie graphs are often better than line graphs at showing how an overall group is divided. However, if a pie graph has too many slices, it can become difficult to interpret.

Bar graphs are especially useful when comparing quantities. For example, if you are studying the populations of different countries, as in Figure A7, bar graphs can show the relationships between the population sizes of multiple countries. Not only can it show these relationships, but it can also show breakdowns of different groups within the population.

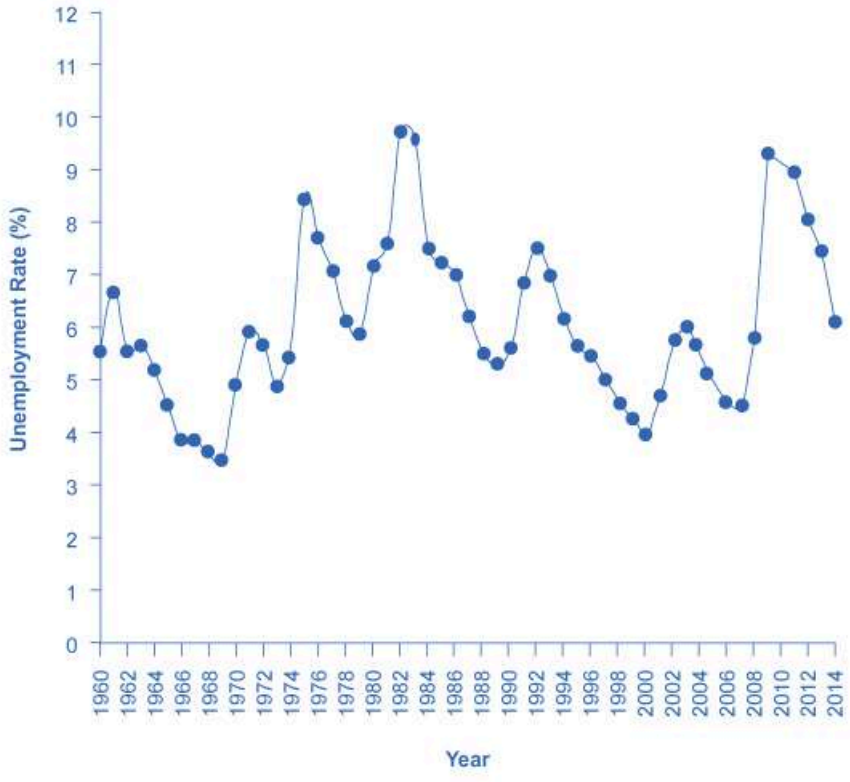
A line graph is often the most effective format for illustrating a relationship between two variables that are both changing. For example, time series graphs can show patterns as time changes, like the unemployment rate over time. Line graphs are widely used in economics to present continuous data about prices, wages, quantities bought and sold, the size of the economy.

How Graphs Can Be Misleading

Graphs not only reveal patterns; they can also alter how patterns are perceived. To see some of the ways this can be done, consider the line graphs of Figure A9, Figure A10, and Figure A11. These graphs all illustrate the unemployment rate—but from different perspectives.

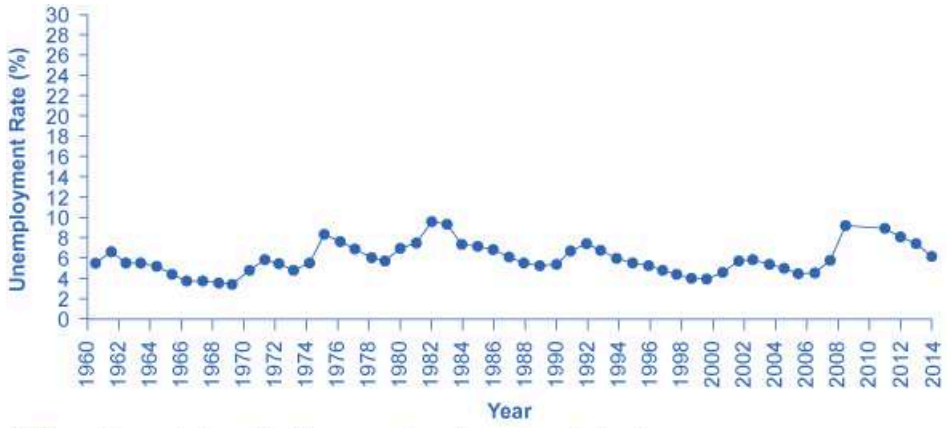


(a) Unemployment rate, wide and short

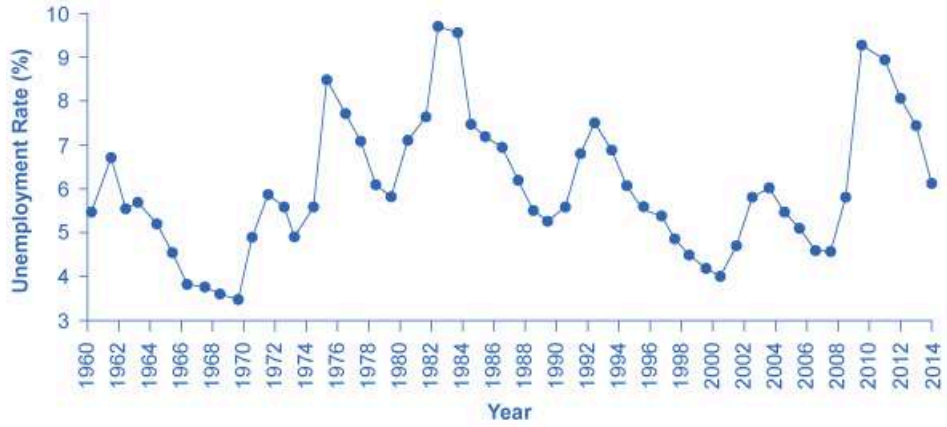


(b) Unemployment rate, narrow and tall

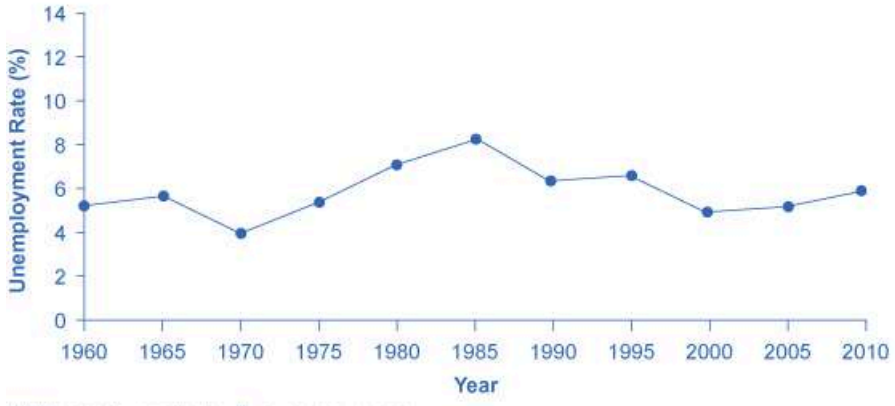
FIGURE A9



(c) Unemployment rate, with wider range of numbers on vertical axis

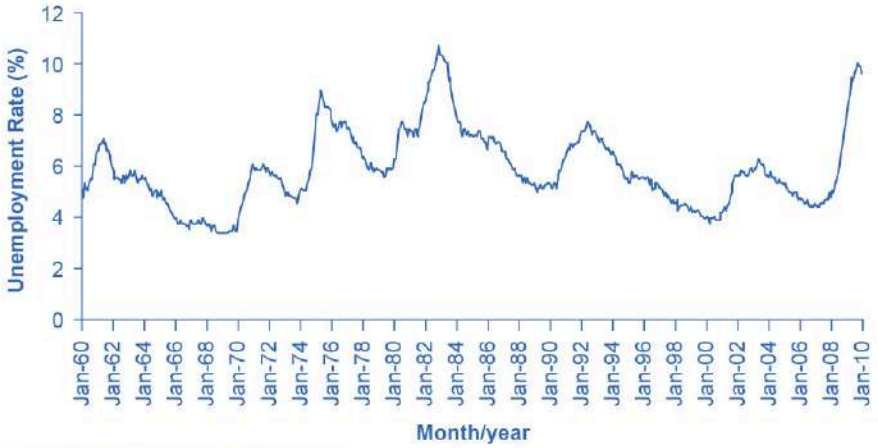


(d) Unemployment rate, with smaller range of numbers on vertical axis

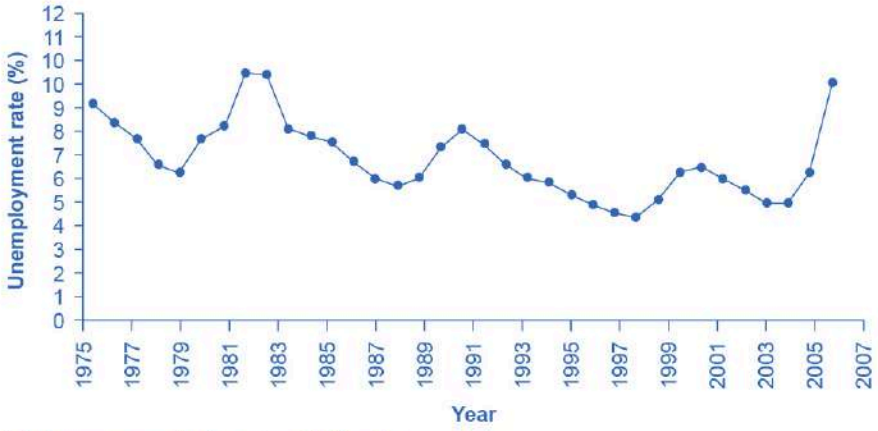


(e) Unemployment rate, five-year averages

FIGURE A10 **Presenting Unemployment Rates in Different Ways, All of Them Accurate** Simply changing the width and height of the area in which data is displayed can alter the perception of the data.



(f) Unemployment rate, monthly data



(g) Unemployment rates, since 1975 only

FIGURE A11 Presenting Unemployment Rates in Different Ways, All of Them Accurate Simply changing the width and height of the area in which data is displayed can alter the perception of the data.

Suppose you wanted a graph which gives the impression that the rise in unemployment in 2009 was not all that large, or all that extraordinary by historical standards. You might choose to present your data as in Figure A9 (a). Figure A9 (a) includes much of the same data presented earlier in Figure A5, but stretches the horizontal axis out longer relative to the vertical axis. By spreading the graph wide and flat, the visual appearance is that the rise in unemployment is not so large, and is similar to some past rises in unemployment. Now imagine you wanted to emphasize how unemployment spiked substantially higher in 2009. In this case, using the same data, you can stretch the vertical axis out relative to the horizontal axis, as in Figure A9 (b), which makes all rises and falls in unemployment appear larger.

A similar effect can be accomplished without changing the length of the axes, but by changing the scale on the vertical axis. In Figure A10 (c), the scale on the vertical axis runs from 0% to 30%, while in Figure A10 (d), the vertical axis runs from 3% to 10%. Compared to Figure A5, where the vertical scale runs from 0% to 12%, Figure A10 (c) makes the fluctuation in unemployment look smaller, while Figure A10 (d) makes it look larger.

Another way to alter the perception of the graph is to reduce the amount of variation by changing the number of points plotted on the graph. Figure A10 (e) shows the unemployment rate according to five-year averages. By averaging out some of the year-to-year changes, the line appears smoother and with fewer highs and lows. In reality, the unemployment rate is reported monthly, and Figure A11 (f) shows the monthly figures since 1960, which fluctuate more than the five-year average. Figure A11 (f) is also a vivid illustration of how graphs can

compress lots of data. The graph includes monthly data since 1960, which over almost 50 years, works out to nearly 600 data points. Reading that list of 600 data points in numerical form would be hypnotic. You can, however, get a good intuitive sense of these 600 data points very quickly from the graph.

A final trick in manipulating the perception of graphical information is that, by choosing the starting and ending points carefully, you can influence the perception of whether the variable is rising or falling. The original data show a general pattern with unemployment low in the 1960s, but spiking up in the mid-1970s, early 1980s, early 1990s, early 2000s, and late 2000s. Figure A11 (g), however, shows a graph that goes back only to 1975, which gives an impression that unemployment was more-or-less gradually falling over time until the 2009 recession pushed it back up to its "original" level—which is a plausible interpretation if one starts at the high point around 1975.

These kinds of tricks—or shall we just call them "presentation choices"— are not limited to line graphs. In a pie chart with many small slices and one large slice, someone must decide what categories should be used to produce these slices in the first place, thus making some slices appear bigger than others. If you are making a bar graph, you can make the vertical axis either taller or shorter, which will tend to make variations in the height of the bars appear more or less.

Being able to read graphs is an essential skill, both in economics and in life. A graph is just one perspective or point of view, shaped by choices such as those discussed in this section. Do not always believe the first quick impression from a graph. View with caution.

Key Concepts and Summary

Math is a tool for understanding economics and economic relationships can be expressed mathematically using algebra or graphs. The algebraic equation for a line is y = b + mx, where x is the variable on the horizontal axis and y is the variable on the vertical axis, the b term is the y-intercept and the m term is the slope. The slope of a line is the same at any point on the line and it indicates the relationship (positive, negative, or zero) between two economic variables.

Economic models can be solved algebraically or graphically. Graphs allow you to illustrate data visually. They can illustrate patterns, comparisons, trends, and apportionment by condensing the numerical data and providing an intuitive sense of relationships in the data. A line graph shows the relationship between two variables: one is shown on the horizontal axis and one on the vertical axis. A pie graph shows how something is allotted, such as a sum of money or a group of people. The size of each slice of the pie is drawn to represent the corresponding percentage of the whole. A bar graph uses the height of bars to show a relationship, where each bar represents a certain entity, like a country or a group of people. The bars on a bar graph can also be divided into segments to show subgroups.

Any graph is a single visual perspective on a subject. The impression it leaves will be based on many choices, such as what data or time frame is included, how data or groups are divided up, the relative size of vertical and horizontal axes, whether the scale used on a vertical starts at zero. Thus, any graph should be regarded somewhat skeptically, remembering that the underlying relationship can be open to different interpretations.

Review Questions

Exercise A1
Name three kinds of graphs and briefly state when is most appropriate to use each type of graph.

Exercise A2
What is slope on a line graph?

Exercise A3
What do the slices of a pie chart represent?

Exercise A4

Why is a bar chart the best way to illustrate comparisons?

Exercise A5
How does the appearance of positive slope differ from negative slope and from zero slope?

APPENDIX B

Indifference Curves

Economists use a vocabulary of maximizing utility to describe people's preferences. In Consumer Choices, the level of utility that a person receives is described in numerical terms. This appendix presents an alternative approach to describing personal preferences, called indifference curves, which avoids any need for using numbers to measure utility. By setting aside the assumption of putting a numerical valuation on utility—an assumption that many students and economists find uncomfortably unrealistic—the indifference curve framework helps to clarify the logic of the underlying model.

What Is an Indifference Curve?

People cannot really put a numerical value on their level of satisfaction. However, they can, and do, identify what choices would give them more, or less, or the same amount of satisfaction. An indifference curve shows combinations of goods that provide an equal level of utility or satisfaction. For example, Figure B1 presents three indifference curves that represent Lilly's preferences for the tradeoffs that she faces in her two main relaxation activities: eating doughnuts and reading paperback books. Each indifference curve (Ul, Um, and Uh) represents one level of utility. First we will explore the meaning of one particular indifference curve and then we will look at the indifference curves as a group.

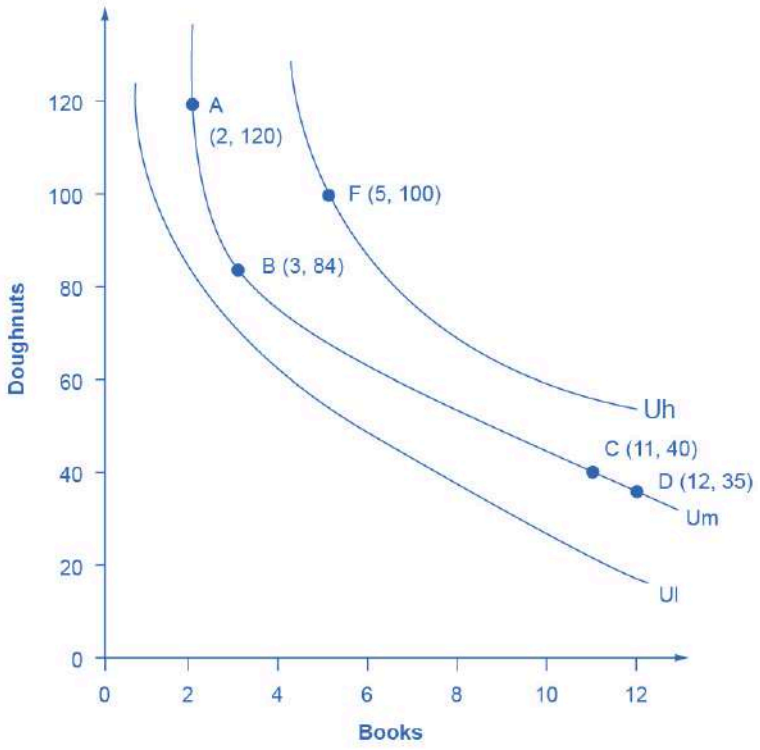


FIGURE B1 Lilly's Indifference Curves Lilly would receive equal utility from all points on a given indifference curve. Any points on the highest indifference curve Uh, like F, provide greater utility than any points like A, B, C, and D on the middle indifference curve Um. Similarly, any points on the middle indifference curve Um provide greater utility than any points on the lowest indifference curve Ul.

The Shape of an Indifference Curve

The indifference curve Um has four points labeled on it: A, B, C, and D. Since an indifference curve represents a set of choices that have the same level of utility, Lilly must receive an equal amount of utility, judged according to her personal preferences, from two books and 120 doughnuts (point A), from three books and 84 doughnuts (point B) from 11 books and 40 doughnuts (point C) or from 12 books and 35 doughnuts (point D). She would also receive the same utility from any of the unlabeled intermediate points along this indifference curve.

Indifference curves have a roughly similar shape in two ways: 1) they are downward sloping from left to right; 2) they are convex with respect to the origin. In other words, they are steeper on the left and flatter on the right. The downward slope of the indifference curve means that Lilly must trade off less of one good to get more of the other, while holding utility constant. For example, points A and B sit on the same indifference curve Um, which means that they provide Lilly with the same level of utility. Thus, the marginal utility that Lilly would gain from, say, increasing her consumption of books from two to three must be equal to the marginal utility that she would lose if her consumption of doughnuts was cut from 120 to 84—so that her overall utility remains unchanged between points A and B. Indeed, the slope along an indifference curve as the marginal rate of substitution, which is the rate at which a person is willing to trade one good for another so that utility will remain the same.

Indifference curves like Um are steeper on the left and flatter on the right. The reason behind this shape involves diminishing marginal utility—the notion that as a person consumes more of a good, the marginal utility from each additional unit becomes lower. Compare two different choices between points that all provide Lilly an equal amount of utility along the indifference curve Um: the choice between A and B, and between C and D. In both choices, Lilly consumes one more book, but between A and B her consumption of doughnuts falls by 36 (from 120 to 84) and between C and D it falls by only five (from 40 to 35). The reason for this difference is that points A and C are different starting points, and thus have different implications for marginal utility. At point A, Lilly has few books and many doughnuts. Thus, her marginal utility from an extra book will be relatively high while the marginal utility of additional doughnuts is relatively low—so on the margin, it will take a relatively large number of doughnuts to offset the utility from the marginal book. At point C, however, Lilly has many books and few doughnuts. From this starting point, her marginal utility gained from extra books will be relatively low, while the marginal utility lost from additional doughnuts would be relatively high—so on the margin, it will take a relatively smaller number of doughnuts to offset the change of one marginal book. In short, the slope of the indifference curve changes because the marginal rate of substitution—that is, the quantity of one good that would be traded for the other good to keep utility constant—also changes, as a result of diminishing marginal utility of both goods.

The Field of Indifference Curves

Each indifference curve represents the choices that provide a single level of utility. Every level of utility will have its own indifference curve. Thus, Lilly's preferences will include an infinite number of indifference curves lying nestled together on the diagram—even though only three of the indifference curves, representing three levels of utility, appear on Figure B1. In other words, an infinite number of indifference curves are not drawn on this diagram—but you should remember that they exist.

Higher indifference curves represent a greater level of utility than lower ones. In Figure B1, indifference curve Ul can be thought of as a "low" level of utility, while Um is a "medium" level of utility and Uh is a "high" level of utility. All of the choices on indifference curve Uh are preferred to all of the choices on indifference curve Um, which in turn are preferred to all of the choices on Ul.

To understand why higher indifference curves are preferred to lower ones, compare point B on indifference curve Um to point F on indifference curve Uh. Point F has greater consumption of both books (five to three) and doughnuts (100 to 84), so point F is clearly preferable to point B. Given the definition of an indifference curve—that all the points on the curve have the same level of utility—if point F on indifference curve Uh is preferred to point B on indifference curve Um, then it must be true that all points on indifference curve Uh

have a higher level of utility than all points on Um. More generally, for any point on a lower indifference curve, like Ul, you can identify a point on a higher indifference curve like Um or Uh that has a higher consumption of both goods. Since one point on the higher indifference curve is preferred to one point on the lower curve, and since all the points on a given indifference curve have the same level of utility, it must be true that all points on higher indifference curves have greater utility than all points on lower indifference curves.

These arguments about the shapes of indifference curves and about higher or lower levels of utility do not require any numerical estimates of utility, either by the individual or by anyone else. They are only based on the assumptions that when people have less of one good they need more of another good to make up for it, if they are keeping the same level of utility, and that as people have more of a good, the marginal utility they receive from additional units of that good will diminish. Given these gentle assumptions, a field of indifference curves can be mapped out to describe the preferences of any individual.

The Individuality of Indifference Curves

Each person determines their own preferences and utility. Thus, while indifference curves have the same general shape—they slope down, and the slope is steeper on the left and flatter on the right—the specific shape of indifference curves can be different for every person. Figure B1, for example, applies only to Lilly's preferences. Indifference curves for other people would probably travel through different points.

Utility-Maximizing with Indifference Curves

People seek the highest level of utility, which means that they wish to be on the highest possible indifference curve. However, people are limited by their budget constraints, which show what tradeoffs are actually possible.

Maximizing Utility at the Highest Indifference Curve

Return to the situation of Lilly's choice between paperback books and doughnuts. Say that books cost $6, doughnuts are 50 cents each, and that Lilly has $60 to spend. This information provides the basis for the budget line shown in Figure B2. Along with the budget line are shown the three indifference curves from Figure B1. What is Lilly's utility-maximizing choice? Several possibilities are identified in the diagram.

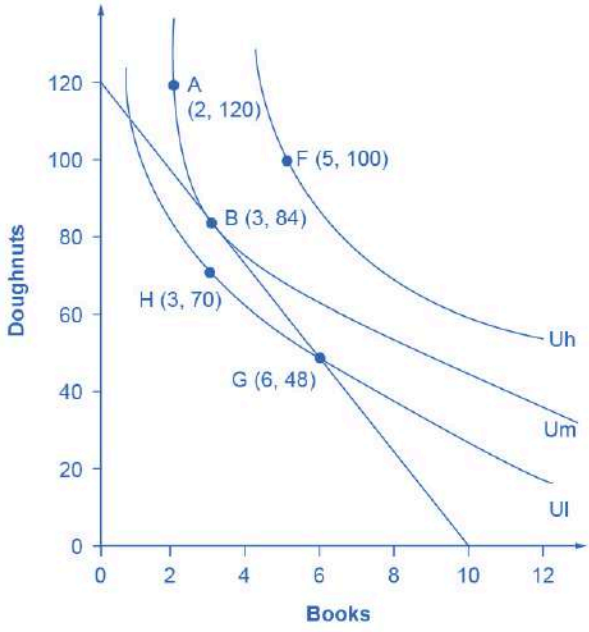


FIGURE B2 Indifference Curves and a Budget Constraint Lilly's preferences are shown by the indifference curves. Lilly's budget constraint, given the prices of books and doughnuts and her income, is shown by the straight line.

Lilly's optimal choice will be point B, where the budget line is tangent to the indifference curve Um. Lilly would have more utility at a point like F on the higher indifference curve Uh, but the budget line does not touch the higher indifference curve Uh at any point, so she cannot afford this choice. A choice like G is affordable to Lilly, but it lies on indifference curve Ul and thus provides less utility than choice B, which is on indifference curve Um.

The choice of F with five books and 100 doughnuts is highly desirable, since it is on the highest indifference curve Uh of those shown in the diagram. However, it is not affordable given Lilly's budget constraint. The choice of H with three books and 70 doughnuts on indifference curve Ul is a wasteful choice, since it is inside Lilly's budget set, and as a utility-maximizer, Lilly will always prefer a choice on the budget constraint itself. Choices B and G are both on the opportunity set. However, choice G of six books and 48 doughnuts is on lower indifference curve Ul than choice B of three books and 84 doughnuts, which is on the indifference curve Um. If Lilly were to start at choice G, and then thought about whether the marginal utility she was deriving from doughnuts and books, she would decide that some additional doughnuts and fewer books would make her happier—which would cause her to move toward her preferred choice B. Given the combination of Lilly's personal preferences, as identified by her indifference curves, and Lilly's opportunity set, which is determined by prices and income, B will be her utility-maximizing choice.

The highest achievable indifference curve touches the opportunity set at a single point of tangency. Since an infinite number of indifference curves exist, even if only a few of them are drawn on any given diagram, there will always exist one indifference curve that touches the budget line at a single point of tangency. All higher indifference curves, like Uh, will be completely above the budget line and, although the choices on that indifference curve would provide higher utility, they are not affordable given the budget set. All lower indifference curves, like Ul, will cross the budget line in two separate places. When one indifference curve crosses the budget line in two places, however, there will be another, higher, attainable indifference curve sitting above it that touches the budget line at only one point of tangency.

Changes in Income

A rise in income causes the budget constraint to shift to the right. In graphical terms, the new budget constraint will now be tangent to a higher indifference curve, representing a higher level of utility. A reduction in income will cause the budget constraint to shift to the left, which will cause it to be tangent to a lower indifference curve, representing a reduced level of utility. If income rises by, for example, 50%, exactly how much will a person alter consumption of books and doughnuts? Will consumption of both goods rise by 50%, or will the quantity of one good rise substantially, while the quantity of the other good rises only a little, or even declines?

Since personal preferences and the shape of indifference curves are different for each individual, the response to changes in income will be different, too. For example, consider the preferences of Manuel and Natasha in Figure B3 (a) and Figure B3 (b). They each start with an identical income of $40, which they spend on yogurts that cost $1 and rental movies that cost $4. Thus, they face identical budget constraints. However, based on Manuel's preferences, as revealed by his indifference curves, his utility-maximizing choice on the original budget set occurs where his opportunity set is tangent to the highest possible indifference curve at W, with three movies and 28 yogurts, while Natasha's utility-maximizing choice on the original budget set at Y will be seven movies and 12 yogurts.

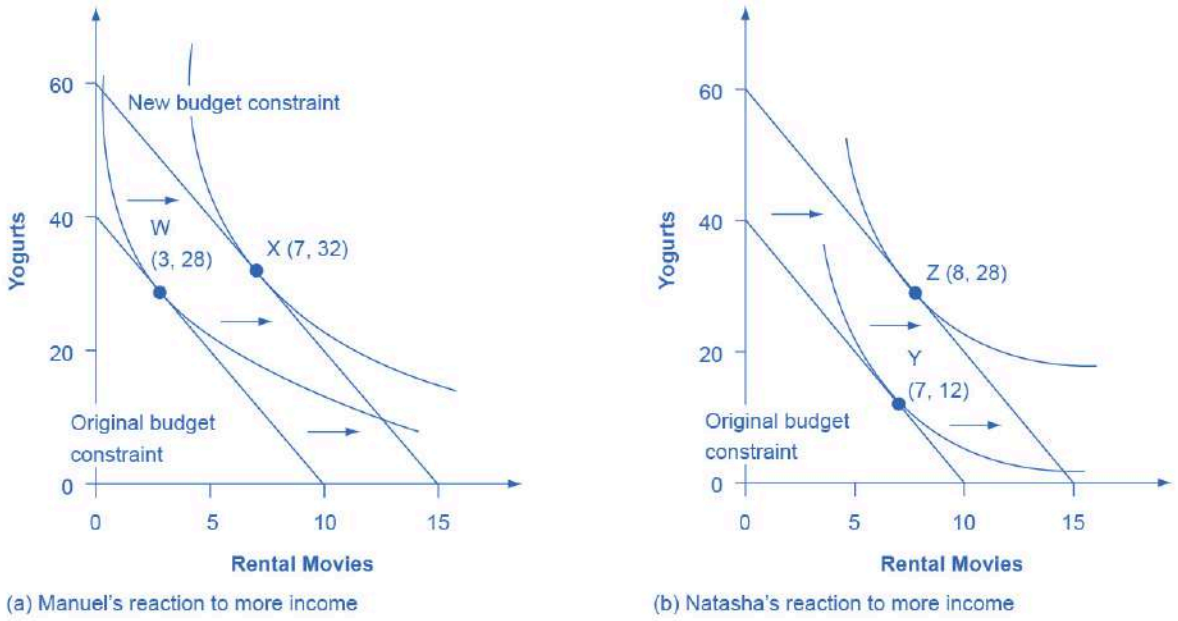


FIGURE B3 Manuel and Natasha's Indifference Curves Manuel and Natasha originally face the same budget constraints; that is, same prices and same income. However, the indifference curves that illustrate their preferences are not the same. (a) Manuel's original choice at W involves more yogurt and more movies, and he reacts to the higher income by mainly increasing consumption of movies at X. (b) Conversely, Natasha's original choice (Y) involves relatively more movies, but she reacts to the higher income by choosing relatively more yogurts. Even when budget constraints are the same, personal preferences lead to different original choices and to different reactions in response to a change in income.

Now, say that income rises to $60 for both Manuel and Natasha, so their budget constraints shift to the right. As shown in Figure B3 (a), Manuel's new utility maximizing choice at X will be seven movies and 32 yogurts—that is, Manuel will choose to spend most of the extra income on movies. Natasha's new utility maximizing choice at Z will be eight movies and 28 yogurts—that is, she will choose to spend most of the extra income on yogurt. In this way, the indifference curve approach allows for a range of possible responses. However, if both goods are normal goods, then the typical response to a higher level of income will be to purchase more of them—although exactly how much more is a matter of personal preference. If one of the goods is an inferior good, the response to a higher level of income will be to purchase less of it.

Responses to Price Changes: Substitution and Income Effects

A higher price for a good will cause the budget constraint to shift to the left, so that it is tangent to a lower indifference curve representing a reduced level of utility. Conversely, a lower price for a good will cause the opportunity set to shift to the right, so that it is tangent to a higher indifference curve representing an increased level of utility. Exactly how much a change in price will lead to the quantity demanded of each good will depend on personal preferences.

Anyone who faces a change in price will experience two interlinked motivations: a substitution effect and an income effect. The substitution effect is that when a good becomes more expensive, people seek out substitutes. If oranges become more expensive, fruit-lovers scale back on oranges and eat more apples, grapefruit, or raisins. Conversely, when a good becomes cheaper, people substitute toward consuming more. If oranges get cheaper, people fire up their juicing machines and ease off on other fruits and foods. The income effect refers to how a change in the price of a good alters the effective buying power of one's income. If the price of a good that you have been buying falls, then in effect your buying power has risen—you are able to purchase more goods. Conversely, if the price of a good that you have been buying rises, then the buying power of a given

amount of income is diminished. (One common source of confusion is that the "income effect" does not refer to a change in actual income. Instead, it refers to the situation in which the price of a good changes, and thus the quantities of goods that can be purchased with a fixed amount of income change. It might be more accurate to call the "income effect" a "buying power effect," but the "income effect" terminology has been used for decades, and it is not going to change during this economics course.) Whenever a price changes, consumers feel the pull of both substitution and income effects at the same time.

Using indifference curves, you can illustrate the substitution and income effects on a graph. In Figure B4, Ogden faces a choice between two goods: haircuts or personal pizzas. Haircuts cost $20, personal pizzas cost $6, and he has $120 to spend.

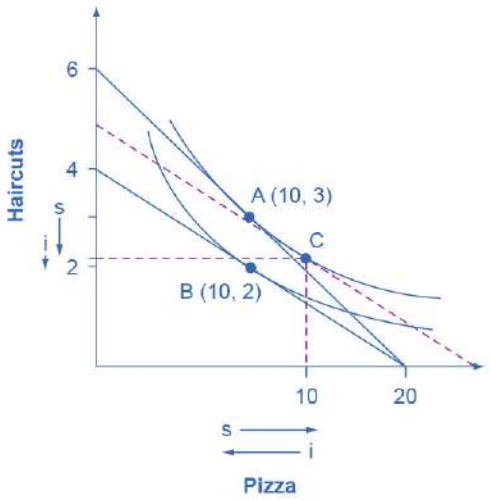


FIGURE B4 Substitution and Income Effects The original choice is A, the point of tangency between the original budget constraint and indifference curve. The new choice is B, the point of tangency between the new budget constraint and the lower indifference curve. Point C is the tangency between the dashed line, where the slope shows the new higher price of haircuts, and the original indifference curve. The substitution effect is the shift from A to C, which means getting fewer haircuts and more pizza. The income effect is the shift from C to B; that is, the reduction in buying power that causes a shift from the higher indifference curve to the lower indifference curve, with relative prices remaining unchanged. The income effect results in less consumed of both goods. Both substitution and income effects cause fewer haircuts to be consumed. For pizza, in this case, the substitution effect and income effect cancel out, leading to the same amount of pizza consumed.

The price of haircuts rises to $30. Ogden starts at choice A on the higher opportunity set and the higher indifference curve. After the price of haircuts increases, he chooses B on the lower opportunity set and the lower indifference curve. Point B with two haircuts and 10 personal pizzas is immediately below point A with three haircuts and 10 personal pizzas, showing that Ogden reacted to a higher price of haircuts by cutting back only on haircuts, while leaving his consumption of pizza unchanged.

The dashed line in the diagram, and point C, are used to separate the substitution effect and the income effect. To understand their function, start by thinking about the substitution effect with this question: How would Ogden change his consumption if the relative prices of the two goods changed, but this change in relative prices did not affect his utility? The slope of the budget constraint is determined by the relative price of the two goods; thus, the slope of the original budget line is determined by the original relative prices, while the slope of the new budget line is determined by the new relative prices. With this thought in mind, the dashed line is a graphical tool inserted in a specific way: It is inserted so that it is parallel with the new budget constraint, so it reflects the new relative prices, but it is tangent to the original indifference curve, so it reflects the original level of utility or buying power.

Thus, the movement from the original choice (A) to point C is a substitution effect; it shows the choice that

Ogden would make if relative prices shifted (as shown by the different slope between the original budget set and the dashed line) but if buying power did not shift (as shown by being tangent to the original indifference curve). The substitution effect will encourage people to shift away from the good which has become relatively more expensive—in Ogden's case, the haircuts on the vertical axis—and toward the good which has become relatively less expensive—in this case, the pizza on the vertical axis. The two arrows labeled with "s" for "substitution effect," one on each axis, show the direction of this movement.

The income effect is the movement from point C to B, which shows how Ogden reacts to a reduction in his buying power from the higher indifference curve to the lower indifference curve, but holding constant the relative prices (because the dashed line has the same slope as the new budget constraint). In this case, where the price of one good increases, buying power is reduced, so the income effect means that consumption of both goods should fall (if they are both normal goods, which it is reasonable to assume unless there is reason to believe otherwise). The two arrows labeled with "i" for "income effect," one on each axis, show the direction of this income effect movement.

Now, put the substitution and income effects together. When the price of pizza increased, Ogden consumed less of it, for two reasons shown in the exhibit: the substitution effect of the higher price led him to consume less and the income effect of the higher price also led him to consume less. However, when the price of pizza increased, Ogden consumed the same quantity of haircuts. The substitution effect of a higher price for pizza meant that haircuts became relatively less expensive (compared to pizza), and this factor, taken alone, would have encouraged Ogden to consume more haircuts. However, the income effect of a higher price for pizza meant that he wished to consume less of both goods, and this factor, taken alone, would have encouraged Ogden to consume fewer haircuts. As shown in Figure B4, in this particular example the substitution effect and income effect on Ogden's consumption of haircuts are offsetting—so he ends up consuming the same quantity of haircuts after the price increase for pizza as before.

The size of these income and substitution effects will differ from person to person, depending on individual preferences. For example, if Ogden's substitution effect away from pizza and toward haircuts is especially strong, and outweighs the income effect, then a higher price for pizza might lead to increased consumption of haircuts. This case would be drawn on the graph so that the point of tangency between the new budget constraint and the relevant indifference curve occurred below point B and to the right. Conversely, if the substitution effect away from pizza and toward haircuts is not as strong, and the income effect on is relatively stronger, then Ogden will be more likely to react to the higher price of pizza by consuming less of both goods. In this case, his optimal choice after the price change will be above and to the left of choice B on the new budget constraint.

Although the substitution and income effects are often discussed as a sequence of events, it should be remembered that they are twin components of a single cause—a change in price. Although you can analyze them separately, the two effects are always proceeding hand in hand, happening at the same time.

Indifference Curves with Labor-Leisure and Intertemporal Choices

The concept of an indifference curve applies to tradeoffs in any household choice, including the labor-leisure choice or the intertemporal choice between present and future consumption. In the labor-leisure choice, each indifference curve shows the combinations of leisure and income that provide a certain level of utility. In an intertemporal choice, each indifference curve shows the combinations of present and future consumption that provide a certain level of utility. The general shapes of the indifference curves—downward sloping, steeper on the left and flatter on the right—also remain the same.

A Labor-Leisure Example

Petunia is working at a job that pays $12 per hour but she gets a raise to $20 per hour. After family responsibilities and sleep, she has 80 hours per week available for work or leisure. As shown in Figure B5, the highest level of utility for Petunia, on her original budget constraint, is at choice A, where it is tangent to the

lower indifference curve (Ul). Point A has 30 hours of leisure and thus 50 hours per week of work, with income of $600 per week (that is, 50 hours of work at $12 per hour). Petunia then gets a raise to $20 per hour, which shifts her budget constraint to the right. Her new utility-maximizing choice occurs where the new budget constraint is tangent to the higher indifference curve Uh. At B, Petunia has 40 hours of leisure per week and works 40 hours, with income of $800 per week (that is, 40 hours of work at $20 per hour).

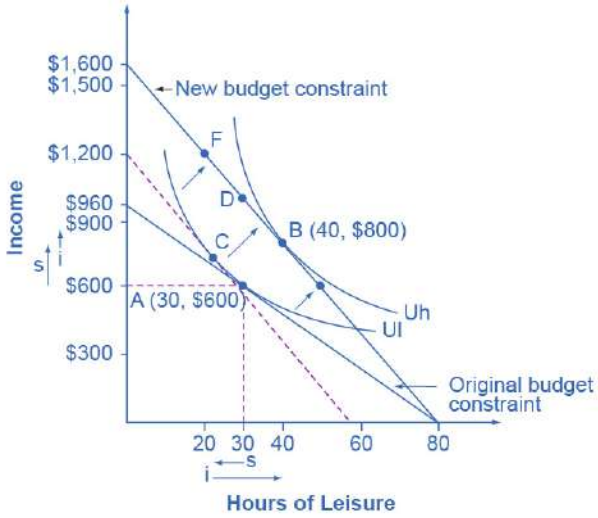


FIGURE B5 Effects of a Change in Petunia's Wage Petunia starts at choice A, the tangency between her original budget constraint and the lower indifference curve Ul. The wage increase shifts her budget constraint to the right, so that she can now choose B on indifference curve Uh. The substitution effect is the movement from A to C. In this case, the substitution effect would lead Petunia to choose less leisure, which is relatively more expensive, and more income, which is relatively cheaper to earn. The income effect is the movement from C to B. The income effect in this example leads to greater consumption of both goods. Overall, in this example, income rises because of both substitution and income effects. However, leisure declines because of the substitution effect but increases because of the income effect—leading, in Petunia's case, to an overall increase in the quantity of leisure consumed.

Substitution and income effects provide a vocabulary for discussing how Petunia reacts to a higher hourly wage. The dashed line serves as the tool for separating the two effects on the graph.

The substitution effect tells how Petunia would have changed her hours of work if her wage had risen, so that income was relatively cheaper to earn and leisure was relatively more expensive, but if she had remained at the same level of utility. The slope of the budget constraint in a labor-leisure diagram is determined by the wage rate. Thus, the dashed line is carefully inserted with the slope of the new opportunity set, reflecting the labor-leisure tradeoff of the new wage rate, but tangent to the original indifference curve, showing the same level of utility or "buying power." The shift from original choice A to point C, which is the point of tangency between the original indifference curve and the dashed line, shows that because of the higher wage, Petunia will want to consume less leisure and more income. The "s" arrows on the horizontal and vertical axes of Figure B5 show the substitution effect on leisure and on income.

The income effect is that the higher wage, by shifting the labor-leisure budget constraint to the right, makes it possible for Petunia to reach a higher level of utility. The income effect is the movement from point C to point B; that is, it shows how Petunia's behavior would change in response to a higher level of utility or "buying power," with the wage rate remaining the same (as shown by the dashed line being parallel to the new budget constraint). The income effect, encouraging Petunia to consume both more leisure and more income, is drawn with arrows on the horizontal and vertical axis of Figure B5.

Putting these effects together, Petunia responds to the higher wage by moving from choice A to choice B. This movement involves choosing more income, both because the substitution effect of higher wages has made

income relatively cheaper or easier to earn, and because the income effect of higher wages has made it possible to have more income and more leisure. Her movement from A to B also involves choosing more leisure because, according to Petunia's preferences, the income effect that encourages choosing more leisure is stronger than the substitution effect that encourages choosing less leisure.

Figure B5 represents only Petunia's preferences. Other people might make other choices. For example, a person whose substitution and income effects on leisure exactly counterbalanced each other might react to a higher wage with a choice like D, exactly above the original choice A, which means taking all of the benefit of the higher wages in the form of income while working the same number of hours. Yet another person, whose substitution effect on leisure outweighed the income effect, might react to a higher wage by making a choice like F, where the response to higher wages is to work more hours and earn much more income. To represent these different preferences, you could easily draw the indifference curve Uh to be tangent to the new budget constraint at D or F, rather than at B.

An Intertemporal Choice Example

Quentin has saved up $10,000. He is thinking about spending some or all of it on a vacation in the present, and then will save the rest for another big vacation five years from now. Over those five years, he expects to earn a total 80% rate of return. Figure B6 shows Quentin's budget constraint and his indifference curves between present consumption and future consumption. The highest level of utility that Quentin can achieve at his original intertemporal budget constraint occurs at point A, where he is consuming $6,000, saving $4,000 for the future, and expecting with the accumulated interest to have $7,200 for future consumption (that is, $4,000 in current financial savings plus the 80% rate of return).

However, Quentin has just realized that his expected rate of return was unrealistically high. A more realistic expectation is that over five years he can earn a total return of 30%. In effect, his intertemporal budget constraint has pivoted to the left, so that his original utility-maximizing choice is no longer available. Will Quentin react to the lower rate of return by saving more, or less, or the same amount? Again, the language of substitution and income effects provides a framework for thinking about the motivations behind various choices. The dashed line, which is a graphical tool to separate the substitution and income effect, is carefully inserted with the same slope as the new opportunity set, so that it reflects the changed rate of return, but it is tangent to the original indifference curve, so that it shows no change in utility or "buying power."

The substitution effect tells how Quentin would have altered his consumption because the lower rate of return makes future consumption relatively more expensive and present consumption relatively cheaper. The movement from the original choice A to point C shows how Quentin substitutes toward more present consumption and less future consumption in response to the lower interest rate, with no change in utility. The substitution arrows on the horizontal and vertical axes of Figure B6 show the direction of the substitution effect motivation. The substitution effect suggests that, because of the lower interest rate, Quentin should consume more in the present and less in the future.

Quentin also has an income effect motivation. The lower rate of return shifts the budget constraint to the left, which means that Quentin's utility or "buying power" is reduced. The income effect (assuming normal goods) encourages less of both present and future consumption. The impact of the income effect on reducing present and future consumption in this example is shown with "i" arrows on the horizontal and vertical axis of Figure B6.

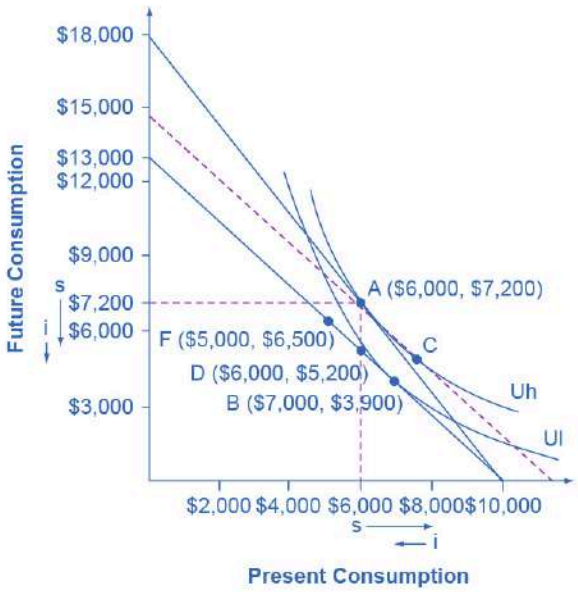


FIGURE B6 **Indifference Curve and an Intertemporal Budget Constraint** The original choice is A, at the tangency between the original budget constraint and the original indifference curve Uh. The dashed line is drawn parallel to the new budget set, so that its slope reflects the lower rate of return, but is tangent to the original indifference curve. The movement from A to C is the substitution effect: in this case, future consumption has become relatively more expensive, and present consumption has become relatively cheaper. The income effect is the shift from C to B; that is, the reduction in utility or "buying power" that causes a move to a lower indifference curve Ul, but with the relative price the same. It means less present and less future consumption. In the move from A to B, the substitution effect on present consumption is greater than the income effect, so the overall result is more present consumption. Notice that the lower indifference curve could have been drawn tangent to the lower budget constraint point D or point F, depending on personal preferences.

Taking both effects together, the substitution effect is encouraging Quentin toward more present and less future consumption, because present consumption is relatively cheaper, while the income effect is encouraging him to less present and less future consumption, because the lower interest rate is pushing him to a lower level of utility. For Quentin's personal preferences, the substitution effect is stronger so that, overall, he reacts to the lower rate of return with more present consumption and less savings at choice B. However, other people might have different preferences. They might react to a lower rate of return by choosing the same level of present consumption and savings at choice D, or by choosing less present consumption and more savings at a point like F. For these other sets of preferences, the income effect of a lower rate of return on present consumption would be relatively stronger, while the substitution effect would be relatively weaker.

Sketching Substitution and Income Effects

Indifference curves provide an analytical tool for looking at all the choices that provide a single level of utility. They eliminate any need for placing numerical values on utility and help to illuminate the process of making utility-maximizing decisions. They also provide the basis for a more detailed investigation of the complementary motivations that arise in response to a change in a price, wage or rate of return—namely, the substitution and income effects.

If you are finding it a little tricky to sketch diagrams that show substitution and income effects so that the points of tangency all come out correctly, it may be useful to follow this procedure.

Step 1. Begin with a budget constraint showing the choice between two goods, which this example will call "candy" and "movies." Choose a point A which will be the optimal choice, where the indifference curve will be tangent—but it is often easier not to draw in the indifference curve just yet. See Figure B7.

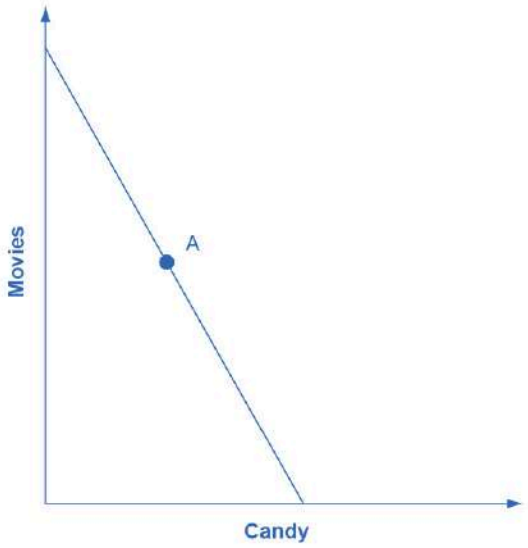


FIGURE B7

Step 2. Now the price of movies changes: let's say that it rises. That shifts the budget set inward. You know that the higher price will push the decision-maker down to a lower level of utility, represented by a lower indifference curve. But at this stage, draw only the new budget set. See Figure B8.

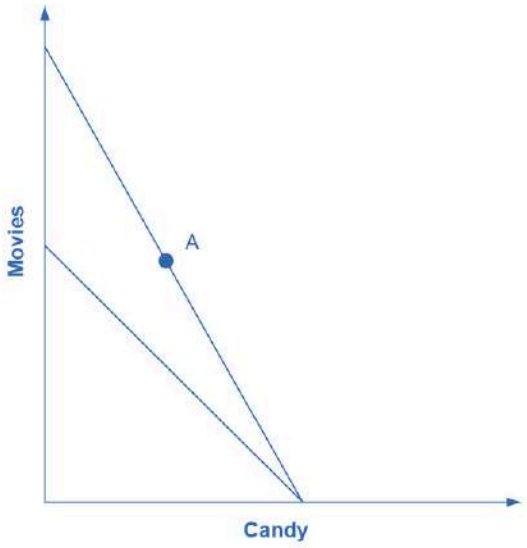


FIGURE B8

Step 3. The key tool in distinguishing between substitution and income effects is to insert a dashed line, parallel to the new budget line. This line is a graphical tool that allows you to distinguish between the two changes: (1) the effect on consumption of the two goods of the shift in prices—with the level of utility remaining unchanged—which is the substitution effect; and (2) the effect on consumption of the two goods of shifting from one indifference curve to the other—with relative prices staying unchanged—which is the income effect. The dashed line is inserted in this step. The trick is to have the dashed line travel close to the original choice A, but not directly through point A. See Figure B9.

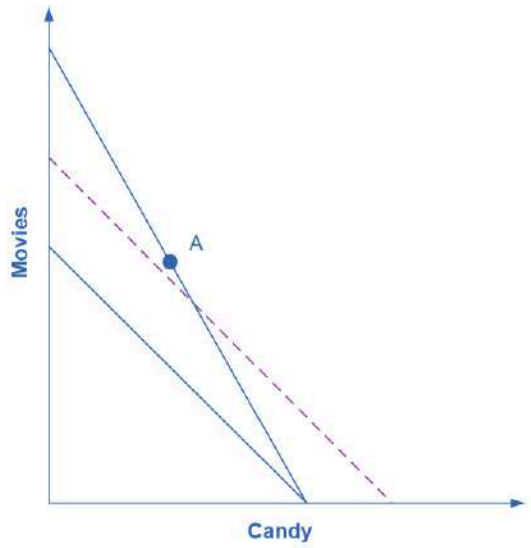


FIGURE B9

Step 4. Now, draw the original indifference curve, so that it is tangent to both point A on the original budget line and to a point C on the dashed line. Many students find it easiest to first select the tangency point C where the original indifference curve touches the dashed line, and then to draw the original indifference curve through A and C. The substitution effect is illustrated by the movement along the original indifference curve as prices change but the level of utility holds constant, from A to C. As expected, the substitution effect leads to less consumed of the good that is relatively more expensive, as shown by the "s" (substitution) arrow on the vertical axis, and more consumed of the good that is relatively less expensive, as shown by the "s" arrow on the horizontal axis. See Figure B10.

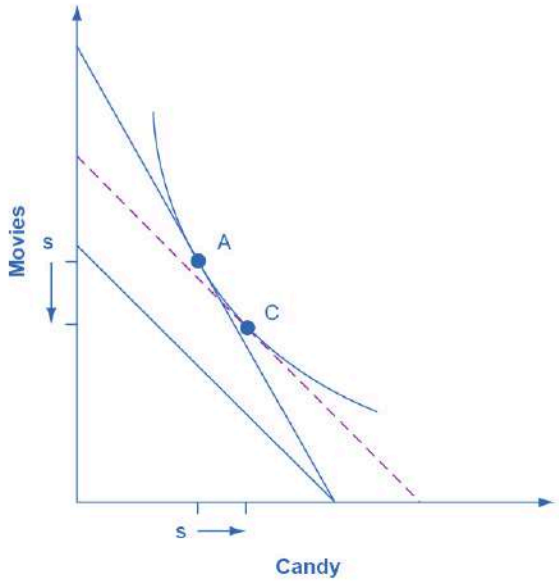


FIGURE B10

Step 5. With the substitution effect in place, now choose utility-maximizing point B on the new opportunity set. When you choose point B, think about whether you wish the substitution or the income effect to have a larger impact on the good (in this case, candy) on the horizontal axis. If you choose point B to be directly in a vertical line with point A (as is illustrated here), then the income effect will be exactly offsetting the substitution effect on the horizontal axis. If you insert point B so that it lies a little to right of the original point A, then the

substitution effect will exceed the income effect. If you insert point B so that it lies a little to the left of point A, then the income effect will exceed the substitution effect. The income effect is the movement from C to B, showing how choices shifted as a result of the decline in buying power and the movement between two levels of utility, with relative prices remaining the same. With normal goods, the negative income effect means less consumed of each good, as shown by the direction of the "i" (income effect) arrows on the vertical and horizontal axes. See Figure B11.

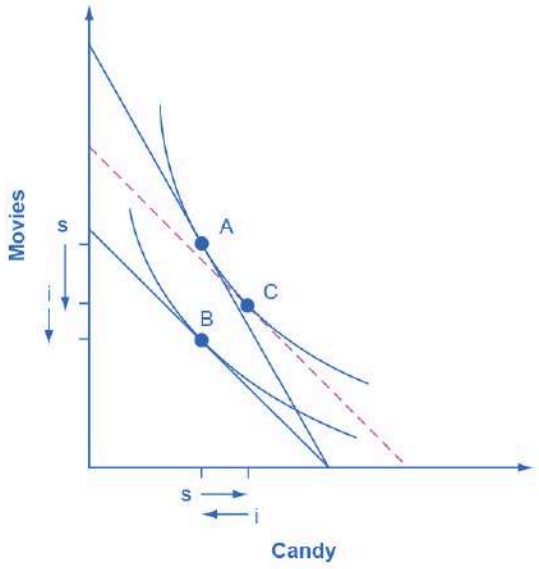


FIGURE B11

In sketching substitution and income effect diagrams, you may wish to practice some of the following variations: (1) Price falls instead of a rising; (2) The price change affects the good on either the vertical or the horizontal axis; (3) Sketch these diagrams so that the substitution effect exceeds the income effect; the income effect exceeds the substitution effect; and the two effects are equal.

One final note: The helpful dashed line can be drawn tangent to the new indifference curve, and parallel to the original budget line, rather than tangent to the original indifference curve and parallel to the new budget line. Some students find this approach more intuitively clear. The answers you get about the direction and relative sizes of the substitution and income effects, however, should be the same.

Key Concepts and Summary

An indifference curve is drawn on a budget constraint diagram that shows the tradeoffs between two goods. All points along a single indifference curve provide the same level of utility. Higher indifference curves represent higher levels of utility. Indifference curves slope downward because, if utility is to remain the same at all points along the curve, a reduction in the quantity of the good on the vertical axis must be counterbalanced by an increase in the quantity of the good on the horizontal axis (or vice versa). Indifference curves are steeper on the far left and flatter on the far right, because of diminishing marginal utility.

The utility-maximizing choice along a budget constraint will be the point of tangency where the budget constraint touches an indifference curve at a single point. A change in the price of any good has two effects: a substitution effect and an income effect. The substitution effect motivation encourages a utility-maximizer to buy less of what is relatively more expensive and more of what is relatively cheaper. The income effect motivation encourages a utility-maximizer to buy more of both goods if utility rises or less of both goods if utility falls (if they are both normal goods).

In a labor-leisure choice, every wage change has a substitution and an income effect. The substitution effect of a wage increase is to choose more income, since it is cheaper to earn, and less leisure, since its opportunity

cost has increased. The income effect of a wage increase is to choose more of leisure and income, since they are both normal goods. The substitution and income effects of a wage decrease would reverse these directions.

In an intertemporal consumption choice, every interest rate change has a substitution and an income effect. The substitution effect of an interest rate increase is to choose more future consumption, since it is now cheaper to earn future consumption and less present consumption (more savings), since the opportunity cost of present consumption in terms of what is being given up in the future has increased. The income effect of an interest rate increase is to choose more of both present and future consumption, since they are both normal goods. The substitution and income effects of an interest rate decrease would reverse these directions.

Review Questions

Exercise B1
What point is preferred along an indifference curve?

Exercise B2
Why do indifference curves slope down?

Exercise B3
Why are indifference curves steep on the left and flatter on the right?

Exercise B4
How many indifference curves does a person have?

Exercise B5
How can you tell which indifference curves represent higher or lower levels of utility?

Exercise B6
What is a substitution effect?

Exercise B7
What is an income effect?

Exercise B8
Does the “income effect” involve a change in income? Explain.

Exercise B9
Does a change in price have both an income effect and a substitution effect? Does a change in income have both an income effect and a substitution effect?

Exercise B10
Would you expect, in some cases, to see only an income effect or only a substitution effect? Explain.

Exercise B11
Which is larger, the income effect or the substitution effect?

APPENDIX C

Present Discounted Value

As explained in Financial Markets, the prices of stocks and bonds depend on future events. The price of a bond depends on the future payments that the bond is expected to make, including both payments of interest and the repayment of the face value of the bond. The price of a stock depends on the expected future profits earned by the firm. The concept of a present discounted value (PDV), which is defined as the amount you should be willing to pay in the present for a stream of expected future payments, can be used to calculate appropriate prices for stocks and bonds. To place a present discounted value on a future payment, think about what amount of money you would need to have in the present to equal a certain amount in the future. This calculation will require an interest rate. For example, if the interest rate is 10%, then a payment of $110 a year from now will have a present discounted value of $100—that is, you could take $100 in the present and have $110 in the future. We will first shows how to apply the idea of present discounted value to a stock and then we will show how to apply it to a bond.

Applying Present Discounted Value to a Stock

Consider the case of Babble, Inc., a company that offers speaking lessons. For the sake of simplicity, say that the founder of Babble is 63 years old and plans to retire in two years, at which point the company will be disbanded. The company is selling 200 shares of stock and profits are expected to be $15 million right away, in the present, $20 million one year from now, and $25 million two years from now. All profits will be paid out as dividends to shareholders as they occur. Given this information, what will an investor pay for a share of stock in this company?

A financial investor, thinking about what future payments are worth in the present, will need to choose an interest rate. This interest rate will reflect the rate of return on other available financial investment opportunities, which is the opportunity cost of investing financial capital, and also a risk premium (that is, using a higher interest rate than the rates available elsewhere if this investment appears especially risky). In this example, say that the financial investor decides that appropriate interest rate to value these future payments is 15%.

Table C1 shows how to calculate the present discounted value of the future profits. For each time period, when a benefit is going to be received, apply the formula:

$$\text{Present discounted value} = \frac{\text{Future value received years in the future}}{(1 + \text{Interest rate})^{\text{numbers of years t}}}$$

Payments from Firm	Present Value
$15 million in present	$15 million
$20 million in one year	$20 million/$(1 + 0.15)^1$ = $17.4 million
$25 million in two years	$25 million/$(1 + 0.15)^2$ = $18.9 million
Total	*$51.3 million*

TABLE C1 Calculating Present Discounted Value of a Stock

Next, add up all the present values for the different time periods to get a final answer. The present value calculations ask what the amount in the future is worth in the present, given the 15% interest rate. Notice that

a different PDV calculation needs to be done separately for amounts received at different times. Then, divide the PDV of total profits by the number of shares, 200 in this case: 51.3 million/200 = 0.2565 million. The price per share should be about $256,500 per share.

Of course, in the real world expected profits are a best guess, not a hard piece of data. Deciding which interest rate to apply for discounting to the present can be tricky. One needs to take into account both potential capital gains from the future sale of the stock and also dividends that might be paid. Differences of opinion on these issues are exactly why some financial investors want to buy a stock that other people want to sell: they are more optimistic about its future prospects. Conceptually, however, it all comes down to what you are willing to pay in the present for a stream of benefits to be received in the future.

Applying Present Discounted Value to a Bond

A similar calculation works in the case of bonds. Financial Markets explains that if the interest rate falls after a bond is issued, so that the investor has locked in a higher rate, then that bond will sell for more than its face value. Conversely, if the interest rate rises after a bond is issued, then the investor is locked into a lower rate, and the bond will sell for less than its face value. The present value calculation sharpens this intuition.

Think about a simple two-year bond. It was issued for $3,000 at an interest rate of 8%. Thus, after the first year, the bond pays interest of 240 (which is 3,000 × 8%). At the end of the second year, the bond pays $240 in interest, plus the $3,000 in principle. Calculate how much this bond is worth in the present if the discount rate is 8%. Then, recalculate if interest rates rise and the applicable discount rate is 11%. To carry out these calculations, look at the stream of payments being received from the bond in the future and figure out what they are worth in present discounted value terms. The calculations applying the present value formula are shown in Table C2.

Stream of Payments (for the 8% interest rate)	Present Value (for the 8% interest rate)	Stream of Payments (for the 11% interest rate)	Present Value (for the 11% interest rate)
$240 payment after one year	$240/(1 + 0.08)^1 = $222.20	$240 payment after one year	$240/(1 + 0.11)^1 = $216.20
$3,240 payment after second year	$3,240/(1 + 0.08)^2 = $2,777.80	$3,240 payment after second year	$3,240/(1 + 0.11)^2 = $2,629.60
Total	*$3,000*	*Total*	*$2,845.80*

TABLE C2 Computing the Present Discounted Value of a Bond

The first calculation shows that the present value of a $3,000 bond, issued at 8%, is just $3,000. After all, that is how much money the borrower is receiving. The calculation confirms that the present value is the same for the lender. The bond is moving money around in time, from those willing to save in the present to those who want to borrow in the present, but the present value of what is received by the borrower is identical to the present value of what will be repaid to the lender.

The second calculation shows what happens if the interest rate rises from 8% to 11%. The actual dollar payments in the first column, as determined by the 8% interest rate, do not change. However, the present value of those payments, now discounted at a higher interest rate, is lower. Even though the future dollar payments that the bond is receiving have not changed, a person who tries to sell the bond will find that the investment's value has fallen.

Again, real-world calculations are often more complex, in part because, not only the interest rate prevailing in the market, but also the riskiness of whether the borrower will repay the loan, will change. In any case, the price of a bond is always the present value of a stream of future expected payments.

Other Applications

Present discounted value is a widely used analytical tool outside the world of finance. Every time a business thinks about making a physical capital investment, it must compare a set of present costs of making that investment to the present discounted value of future benefits. When government thinks about a proposal to, for example, add safety features to a highway, it must compare costs incurred in the present to benefits received in the future. Some academic disputes over environmental policies, like how much to reduce carbon dioxide emissions because of the risk that they will lead to a warming of global temperatures several decades in the future, turn on how one compares present costs of pollution control with long-run future benefits. Someone who wins the lottery and is scheduled to receive a string of payments over 30 years might be interested in knowing what the present discounted value is of those payments. Whenever a string of costs and benefits stretches from the present into different times in the future, present discounted value becomes an indispensable tool of analysis.

APPENDIX D

The Expenditure-Output Model

(This appendix should be consulted after first reading The Aggregate Demand/Aggregate Supply Model and The Keynesian Perspective.) The fundamental ideas of Keynesian economics were developed before the AD/AS model was popularized. From the 1930s until the 1970s, Keynesian economics was usually explained with a different model, known as the expenditure-output approach. This approach is strongly rooted in the fundamental assumptions of Keynesian economics: it focuses on the total amount of spending in the economy, with no explicit mention of aggregate supply or of the price level (although as you will see, it is possible to draw some inferences about aggregate supply and price levels based on the diagram).

The Axes of the Expenditure-Output Diagram

The expenditure-output model, sometimes also called the Keynesian cross diagram, determines the equilibrium level of real GDP by the point where the total or aggregate expenditures in the economy are equal to the amount of output produced. The axes of the Keynesian cross diagram presented in Figure D1 show real GDP on the horizontal axis as a measure of output and aggregate expenditures on the vertical axis as a measure of spending.

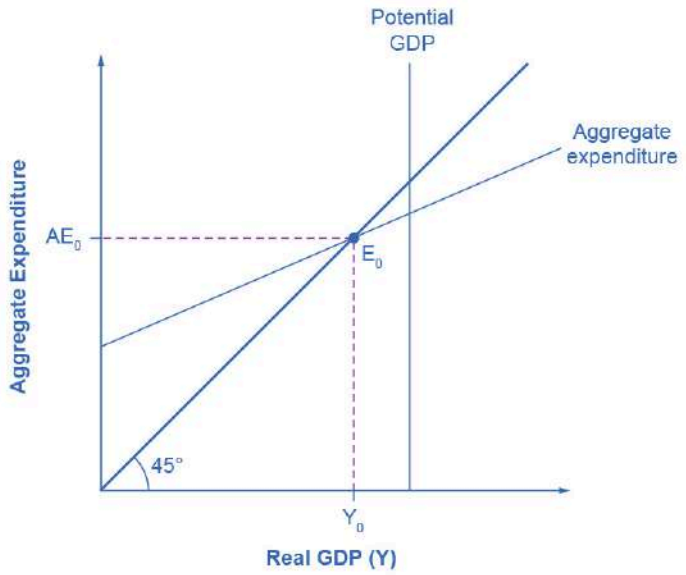


FIGURE D1 The Expenditure-Output Diagram The aggregate expenditure-output model shows aggregate expenditures on the vertical axis and real GDP on the horizontal axis. A vertical line shows potential GDP where full employment occurs. The 45-degree line shows all points where aggregate expenditures and output are equal. The aggregate expenditure schedule shows how total spending or aggregate expenditure increases as output or real GDP rises. The intersection of the aggregate expenditure schedule and the 45-degree line will be the equilibrium. Equilibrium occurs at E_0, where aggregate expenditure AE_0 is equal to the output level Y_0.

Remember that GDP can be thought of in several equivalent ways: it measures both the value of spending on final goods and also the value of the production of final goods. All sales of the final goods and services that make up GDP will eventually end up as income for workers, for managers, and for investors and owners of firms. The sum of all the income received for contributing resources to GDP is called national income (Y). At some points in the discussion that follows, it will be useful to refer to real GDP as "national income." Both axes are measured in real (inflation-adjusted) terms.

The Potential GDP Line and the 45-degree Line

The Keynesian cross diagram contains two lines that serve as conceptual guideposts to orient the discussion. The first is a vertical line showing the level of potential GDP. Potential GDP means the same thing here that it means in the AD/AS diagrams: it refers to the quantity of output that the economy can produce with full employment of its labor and physical capital.

The second conceptual line on the Keynesian cross diagram is the 45-degree line, which starts at the origin and reaches up and to the right. A line that stretches up at a 45-degree angle represents the set of points (1, 1), (2, 2), (3, 3) and so on, where the measurement on the vertical axis is equal to the measurement on the horizontal axis. In this diagram, the 45-degree line shows the set of points where the level of aggregate expenditure in the economy, measured on the vertical axis, is equal to the level of output or national income in the economy, measured by GDP on the horizontal axis.

When the macroeconomy is in equilibrium, it must be true that the aggregate expenditures in the economy are equal to the real GDP—because by definition, GDP is the measure of what is spent on final sales of goods and services in the economy. Thus, the equilibrium calculated with a Keynesian cross diagram will always end up where aggregate expenditure and output are equal—which will only occur along the 45-degree line.

The Aggregate Expenditure Schedule

The final ingredient of the Keynesian cross or expenditure-output diagram is the aggregate expenditure schedule, which will show the total expenditures in the economy for each level of real GDP. The intersection of the aggregate expenditure line with the 45-degree line—at point E_0 in Figure D1—will show the equilibrium for the economy, because it is the point where aggregate expenditure is equal to output or real GDP. After developing an understanding of what the aggregate expenditures schedule means, we will return to this equilibrium and how to interpret it.

Building the Aggregate Expenditure Schedule

Aggregate expenditure is the key to the expenditure-income model. The aggregate expenditure schedule shows, either in the form of a table or a graph, how aggregate expenditures in the economy rise as real GDP or national income rises. Thus, in thinking about the components of the aggregate expenditure line—consumption, investment, government spending, exports and imports—the key question is how expenditures in each category will adjust as national income rises.

Consumption as a Function of National Income

How do consumption expenditures increase as national income rises? People can do two things with their income: consume it or save it (for the moment, let's ignore the need to pay taxes with some of it). Each person who receives an additional dollar faces this choice. The marginal propensity to consume (MPC), is the share of the additional dollar of income a person decides to devote to consumption expenditures. The marginal propensity to save (MPS) is the share of the additional dollar a person decides to save. It must always hold true that:

$$\text{MPC} + \text{MPS} = 1$$

For example, if the marginal propensity to consume out of the marginal amount of income earned is 0.9, then the marginal propensity to save is 0.1.

With this relationship in mind, consider the relationship among income, consumption, and savings shown in Figure D2. (Note that we use "Aggregate Expenditure" on the vertical axis in this and the following figures, because all consumption expenditures are parts of aggregate expenditures.)

An assumption commonly made in this model is that even if income were zero, people would have to consume something. In this example, consumption would be $600 even if income were zero. Then, the MPC is 0.8 and the MPS is 0.2. Thus, when income increases by $1,000, consumption rises by $800 and savings rises by $200.

At an income of $4,000, total consumption will be the $600 that would be consumed even without any income, plus $4,000 multiplied by the marginal propensity to consume of 0.8, or $ 3,200, for a total of $ 3,800. The total amount of consumption and saving must always add up to the total amount of income. (Exactly how a situation of zero income and negative savings would work in practice is not important, because even low-income societies are not literally at zero income, so the point is hypothetical.) This relationship between income and consumption, illustrated in Figure D2 and Table D1, is called the consumption function.

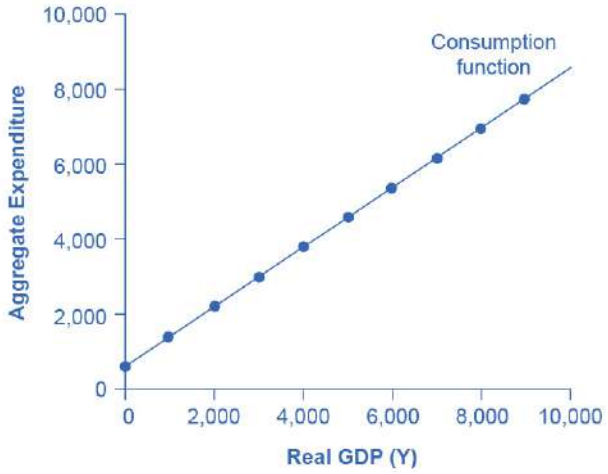


FIGURE D2 The Consumption Function In the expenditure-output model, how does consumption increase with the level of national income? Output on the horizontal axis is conceptually the same as national income, since the value of all final output that is produced and sold must be income to someone, somewhere in the economy. At a national income level of zero, $600 is consumed. Then, each time income rises by $1,000, consumption rises by $800, because in this example, the marginal propensity to consume is 0.8.

The pattern of consumption shown in Table D1 is plotted in Figure D2. To calculate consumption, multiply the income level by 0.8, for the marginal propensity to consume, and add $600, for the amount that would be consumed even if income was zero. Consumption plus savings must be equal to income.

Income	Consumption	Savings
$0	$600	–$600
$1,000	$1,400	–$400
$2,000	$2,200	–$200
$3,000	$3,000	$0
$4,000	$3,800	$200
$5,000	$4,600	$400
$6,000	$5,400	$600
$7,000	$6,200	$800

TABLE D1 The Consumption Function

Income	Consumption	Savings
$8,000	$7,000	$1,000
$9,000	$7,800	$1,200

TABLE D1 The Consumption Function

However, a number of factors other than income can also cause the entire consumption function to shift. These factors were summarized in the earlier discussion of consumption, and listed in Table D1. When the consumption function moves, it can shift in two ways: either the entire consumption function can move up or down in a parallel manner, or the slope of the consumption function can shift so that it becomes steeper or flatter. For example, if a tax cut leads consumers to spend more, but does not affect their marginal propensity to consume, it would cause an upward shift to a new consumption function that is parallel to the original one. However, a change in household preferences for saving that reduced the marginal propensity to save would cause the slope of the consumption function to become steeper: that is, if the savings rate is lower, then every increase in income leads to a larger rise in consumption.

Investment as a Function of National Income

Investment decisions are forward-looking, based on expected rates of return. Precisely because investment decisions depend primarily on perceptions about future economic conditions, they do *not* depend primarily on the level of GDP in the current year. Thus, on a Keynesian cross diagram, the investment function can be drawn as a horizontal line, at a fixed level of expenditure. Figure D3 shows an investment function where the level of investment is, for the sake of concreteness, set at the specific level of 500. Just as a consumption function shows the relationship between consumption levels and real GDP (or national income), the investment function shows the relationship between investment levels and real GDP.

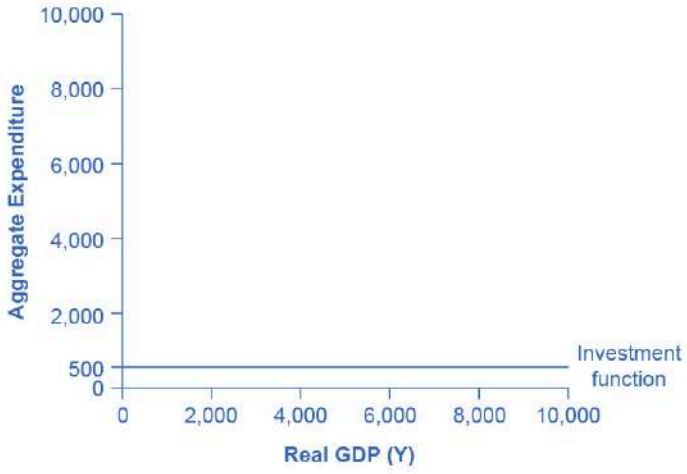


FIGURE D3 The Investment Function The investment function is drawn as a flat line because investment is based on interest rates and expectations about the future, and so it does not change with the level of current national income. In this example, investment expenditures are at a level of 500. However, changes in factors like technological opportunities, expectations about near-term economic growth, and interest rates would all cause the investment function to shift up or down.

The appearance of the investment function as a horizontal line does not mean that the level of investment never moves. It means only that in the context of this two-dimensional diagram, the level of investment on the vertical aggregate expenditure axis does not vary according to the current level of real GDP on the horizontal

axis. However, all the other factors that vary investment—new technological opportunities, expectations about near-term economic growth, interest rates, the price of key inputs, and tax incentives for investment—can cause the horizontal investment function to shift up or down.

Government Spending and Taxes as a Function of National Income

In the Keynesian cross diagram, government spending appears as a horizontal line, as in Figure D4, where government spending is set at a level of 1,300. As in the case of investment spending, this horizontal line does not mean that government spending is unchanging. It means only that government spending changes when Congress decides on a change in the budget, rather than shifting in a predictable way with the current size of the real GDP shown on the horizontal axis.

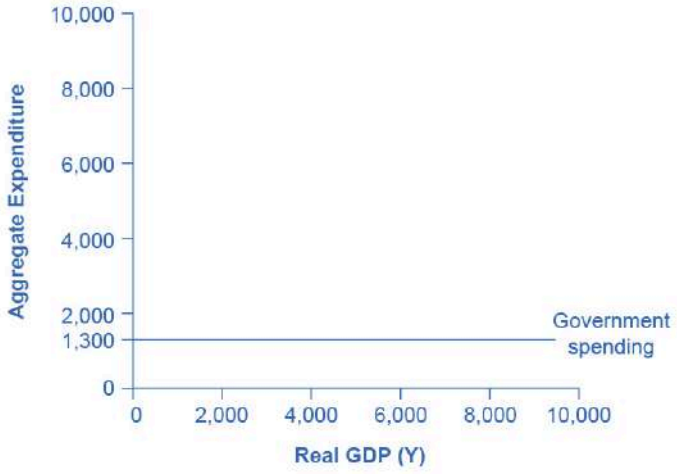


FIGURE D4 The Government Spending Function The level of government spending is determined by political factors, not by the level of real GDP in a given year. Thus, government spending is drawn as a horizontal line. In this example, government spending is at a level of 1,300. Congressional decisions to increase government spending will cause this horizontal line to shift up, while decisions to reduce spending would cause it to shift down.

The situation of taxes is different because taxes often rise or fall with the volume of economic activity. For example, income taxes are based on the level of income earned and sales taxes are based on the amount of sales made, and both income and sales tend to be higher when the economy is growing and lower when the economy is in a recession. For the purposes of constructing the basic Keynesian cross diagram, it is helpful to view taxes as a proportionate share of GDP. In the United States, for example, taking federal, state, and local taxes together, government typically collects about 30–35 % of income as taxes.

Table D2 revises the earlier table on the consumption function so that it takes taxes into account. The first column shows national income. The second column calculates taxes, which in this example are set at a rate of 30%, or 0.3. The third column shows after-tax income; that is, total income minus taxes. The fourth column then calculates consumption in the same manner as before: multiply after-tax income by 0.8, representing the marginal propensity to consume, and then add $600, for the amount that would be consumed even if income was zero. When taxes are included, the marginal propensity to consume is reduced by the amount of the tax rate, so each additional dollar of income results in a smaller increase in consumption than before taxes. For this reason, the consumption function, with taxes included, is flatter than the consumption function without taxes, as Figure D5 shows.

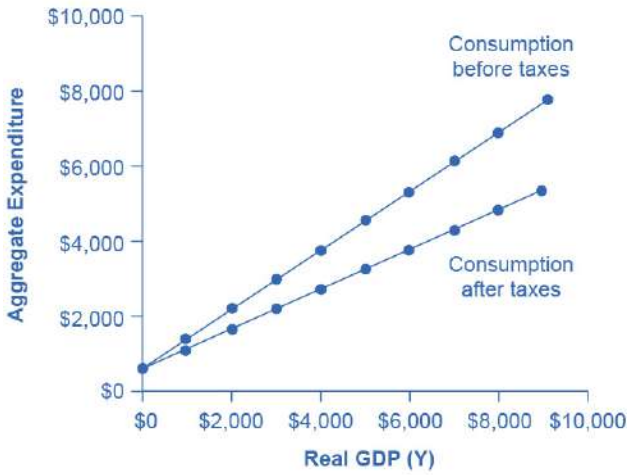


FIGURE D5 The Consumption Function Before and After Taxes The upper line repeats the consumption function from Figure D2. The lower line shows the consumption function if taxes must first be paid on income, and then consumption is based on after-tax income.

Income	Taxes	After-Tax Income	Consumption	Savings
$0	$0	$0	$600	–$600
$1,000	$300	$700	$1,160	–$460
$2,000	$600	$1,400	$1,720	–$320
$3,000	$900	$2,100	$2,280	–$180
$4,000	$1,200	$2,800	$2,840	–$40
$5,000	$1,500	$3,500	$3,400	$100
$6,000	$1,800	$4,200	$3,960	$240
$7,000	$2,100	$4,900	$4,520	$380
$8,000	$2,400	$5,600	$5,080	$520
$9,000	$2,700	$6,300	$5,640	$660

TABLE D2 The Consumption Function Before and After Taxes

Exports and Imports as a Function of National Income

The export function, which shows how exports change with the level of a country's own real GDP, is drawn as a horizontal line, as in the example in Figure D6 (a) where exports are drawn at a level of $840. Again, as in the case of investment spending and government spending, drawing the export function as horizontal does not imply that exports never change. It just means that they do not change because of what is on the horizontal axis—that is, a country's own level of domestic production—and instead are shaped by the level of aggregate demand in other countries. More demand for exports from other countries would cause the export function to shift up; less demand for exports from other countries would cause it to shift down.

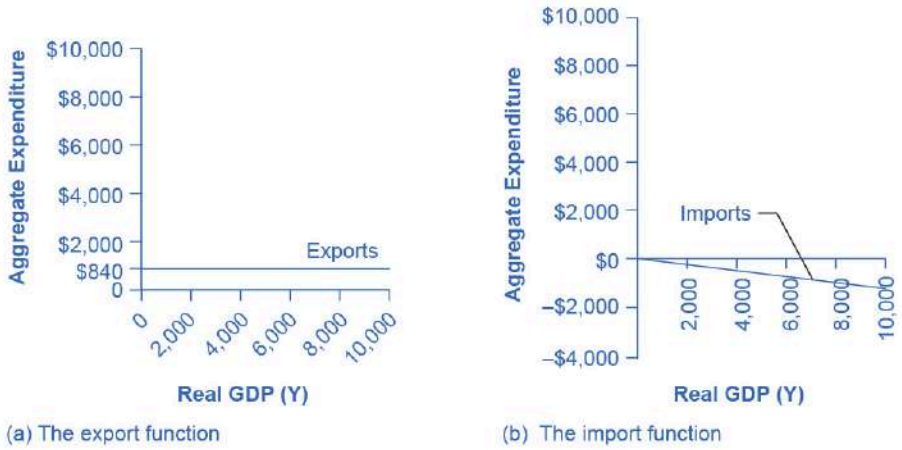


FIGURE D6 The Export and Import Functions (a) The export function is drawn as a horizontal line because exports are determined by the buying power of other countries and thus do not change with the size of the domestic economy. In this example, exports are set at 840. However, exports can shift up or down, depending on buying patterns in other countries. (b) The import function is drawn in negative territory because expenditures on imported products are a subtraction from expenditures in the domestic economy. In this example, the marginal propensity to import is 0.1, so imports are calculated by multiplying the level of income by –0.1.

Imports are drawn in the Keynesian cross diagram as a downward-sloping line, with the downward slope determined by the marginal propensity to import (MPI), out of national income. In Figure D6 (b), the marginal propensity to import is 0.1. Thus, if real GDP is $5,000, imports are $500; if national income is $6,000, imports are $600, and so on. The import function is drawn as downward sloping and negative, because it represents a subtraction from the aggregate expenditures in the domestic economy. A change in the marginal propensity to import, perhaps as a result of changes in preferences, would alter the slope of the import function.

WORK IT OUT

Using an Algebraic Approach to the Expenditure-Output Model

In the expenditure-output or Keynesian cross model, the equilibrium occurs where the aggregate expenditure line (AE line) crosses the 45-degree line. Given algebraic equations for two lines, the point where they cross can be readily calculated. Imagine an economy with the following characteristics.

Y = Real GDP or national income

T = Taxes = 0.3Y

C = Consumption = 140 + 0.9(Y – T)

I = Investment = 400

G = Government spending = 800

X = Exports = 600

M = Imports = 0.15Y

Step 1. Determine the aggregate expenditure function. In this case, it is:

$$AE = C + I + G + X - M$$

$$AE = 140 + 0.9(Y - T) + 400 + 800 + 600 - 0.15Y$$

Step 2. The equation for the 45-degree line is the set of points where GDP or national income on the horizontal

axis is equal to aggregate expenditure on the vertical axis. Thus, the equation for the 45-degree line is: AE = Y.

Step 3. The next step is to solve these two equations for Y (or AE, since they will be equal to each other). Substitute Y for AE:

$$Y = 140 + 0.9(Y - T) + 400 + 800 + 600 - 0.15Y$$

Step 4. Insert the term 0.3Y for the tax rate T. This produces an equation with only one variable, Y.

Step 5. Work through the algebra and solve for Y.

$$\begin{aligned} Y &= 140 + 0.9(Y - 0.3Y) + 400 + 800 + 600 - 0.15Y \\ Y &= 140 + 0.9Y - 0.27Y + 1800 - 0.15Y \\ Y &= 1940 + 0.48Y \\ Y - 0.48Y &= 1940 \\ 0.52Y &= 1940 \\ \frac{0.52Y}{0.52} &= \frac{1940}{0.52} \\ Y &= 3730 \end{aligned}$$

This algebraic framework is flexible and useful in predicting how economic events and policy actions will affect real GDP.

Step 6. Say, for example, that because of changes in the relative prices of domestic and foreign goods, the marginal propensity to import falls to 0.1. Calculate the equilibrium output when the marginal propensity to import is changed to 0.1.

$$\begin{aligned} Y &= 140 + 0.9(Y - 0.3Y) + 400 + 800 + 600 - 0.1Y \\ Y &= 1940 - 0.53Y \\ 0.47Y &= 1940 \\ Y &= 4127 \end{aligned}$$

Step 7. Because of a surge of business confidence, investment rises to 500. Calculate the equilibrium output.

$$\begin{aligned} Y &= 140 + 0.9(Y - 0.3Y) + 500 + 800 + 600 - 0.15Y \\ Y &= 2040 + 0.48Y \\ Y - 0.48Y &= 2040 \\ 0.52Y &= 2040 \\ Y &= 3923 \end{aligned}$$

For issues of policy, the key questions would be how to adjust government spending levels or tax rates so that the equilibrium level of output is the full employment level. In this case, let the economic parameters be:

Y = National income

T = Taxes = 0.3Y

C = Consumption = 200 + 0.9(Y – T)

I = Investment = 600

G = Government spending = 1,000

X = Exports = 600

Y = Imports = 0.1(Y – T)

Step 8. Calculate the equilibrium for this economy (remember Y = AE).

$$\begin{aligned} Y &= 200 + 0.9(Y - 0.3Y) + 600 + 1000 + 600 - 0.1(Y - 0.3Y) \\ Y - 0.63Y + 0.07Y &= 2400 \\ 0.44Y &= 2400 \\ Y &= 5454 \end{aligned}$$

Step 9. Assume that the full employment level of output is 6,000. What level of government spending would be necessary to reach that level? To answer this question, plug in 6,000 as equal to Y, but leave G as a variable, and solve for G. Thus:

$$6000 = 200 + 0.9(6000 - 0.3(6000)) + 600 + G + 600 - 0.1(6000 - 0.3(6000))$$

Step 10. Solve this problem arithmetically. The answer is: G = 1,240. In other words, increasing government spending by 240, from its original level of 1,000, to 1,240, would raise output to the full employment level of GDP.

Indeed, the question of how much to increase government spending so that equilibrium output will rise from 5,454 to 6,000 can be answered without working through the algebra, just by using the multiplier formula. The multiplier equation in this case is:

$$\frac{1}{1 - 0.56} = 2.27$$

Thus, to raise output by 546 would require an increase in government spending of 546/2.27=240, which is the same as the answer derived from the algebraic calculation.

This algebraic framework is highly flexible. For example, taxes can be treated as a total set by political considerations (like government spending) and not dependent on national income. Imports might be based on before-tax income, not after-tax income. For certain purposes, it may be helpful to analyze the economy without exports and imports. A more complicated approach could divide up consumption, investment, government, exports and imports into smaller categories, or to build in some variability in the rates of taxes, savings, and imports. A wise economist will shape the model to fit the specific question under investigation.

Building the Combined Aggregate Expenditure Function

All the components of aggregate demand—consumption, investment, government spending, and the trade balance—are now in place to build the Keynesian cross diagram. Figure D7 builds up an aggregate expenditure function, based on the numerical illustrations of C, I, G, X, and M that have been used throughout this text. The first three columns in Table D3 are lifted from the earlier Table D2, which showed how to bring taxes into the consumption function. The first column is real GDP or national income, which is what appears on the horizontal axis of the income-expenditure diagram. The second column calculates after-tax income, based on the assumption, in this case, that 30% of real GDP is collected in taxes. The third column is based on an MPC of 0.8, so that as after-tax income rises by $700 from one row to the next, consumption rises by $560 (700 × 0.8) from one row to the next. Investment, government spending, and exports do not change with the level of current national income. In the previous discussion, investment was $500, government spending was $1,300, and exports were $840, for a total of $2,640. This total is shown in the fourth column. Imports are 0.1 of real GDP in this example, and the level of imports is calculated in the fifth column. The final column, aggregate expenditures, sums up C + I + G + X – M. This aggregate expenditure line is illustrated in Figure D7.

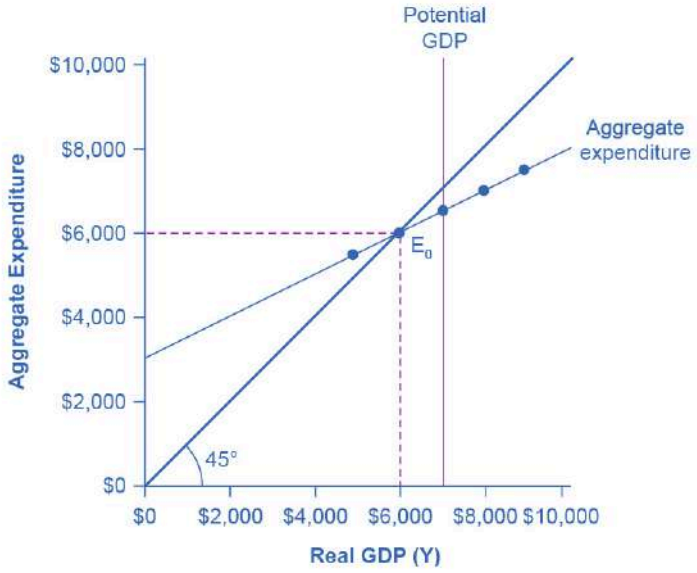


FIGURE D7 A Keynesian Cross Diagram Each combination of national income and aggregate expenditure (after-tax consumption, government spending, investment, exports, and imports) is graphed. The equilibrium occurs where aggregate expenditure is equal to national income; this occurs where the aggregate expenditure schedule crosses the 45-degree line, at a real GDP of $6,000. Potential GDP in this example is $7,000, so the equilibrium is occurring at a level of output or real GDP below the potential GDP level.

National Income	After-Tax Income	Consumption	Government Spending + Investment + Exports	Imports	Aggregate Expenditure
$3,000	$2,100	$2,280	$2,640	$300	$4,620
$4,000	$2,800	$2,840	$2,640	$400	$5,080
$5,000	$3,500	$3,400	$2,640	$500	$5,540
$6,000	$4,200	$3,960	$2,640	$600	$6,000
$7,000	$4,900	$4,520	$2,640	$700	$6,460
$8,000	$5,600	$5,080	$2,640	$800	$6,920
$9,000	$6,300	$5,640	$2,640	$900	$7,380

TABLE D3 National Income-Aggregate Expenditure Equilibrium

The aggregate expenditure function is formed by stacking on top of each other the consumption function (after taxes), the investment function, the government spending function, the export function, and the import function. The point at which the aggregate expenditure function intersects the vertical axis will be determined by the levels of investment, government, and export expenditures—which do not vary with national income. The upward slope of the aggregate expenditure function will be determined by the marginal propensity to save, the tax rate, and the marginal propensity to import. A higher marginal propensity to save, a higher tax rate, and a higher marginal propensity to import will all make the slope of the aggregate expenditure function flatter—because out of any extra income, more is going to savings or taxes or imports and less to spending on domestic goods and services.

The equilibrium occurs where national income is equal to aggregate expenditure, which is shown on the graph

as the point where the aggregate expenditure schedule crosses the 45-degree line. In this example, the equilibrium occurs at 6,000. This equilibrium can also be read off the table under the figure; it is the level of national income where aggregate expenditure is equal to national income.

Equilibrium in the Keynesian Cross Model

With the aggregate expenditure line in place, the next step is to relate it to the two other elements of the Keynesian cross diagram. Thus, the first subsection interprets the intersection of the aggregate expenditure function and the 45-degree line, while the next subsection relates this point of intersection to the potential GDP line.

Where Equilibrium Occurs

The point where the aggregate expenditure line that is constructed from C + I + G + X – M crosses the 45-degree line will be the equilibrium for the economy. It is the only point on the aggregate expenditure line where the total amount being spent on aggregate demand equals the total level of production. In Figure D7, this point of equilibrium (E_0) happens at 6,000, which can also be read off Table D3.

The meaning of "equilibrium" remains the same; that is, equilibrium is a point of balance where no incentive exists to shift away from that outcome. To understand why the point of intersection between the aggregate expenditure function and the 45-degree line is a macroeconomic equilibrium, consider what would happen if an economy found itself to the right of the equilibrium point E, say point H in Figure D8, where output is higher than the equilibrium. At point H, the level of aggregate expenditure is below the 45-degree line, so that the level of aggregate expenditure in the economy is less than the level of output. As a result, at point H, output is piling up unsold—not a sustainable state of affairs.

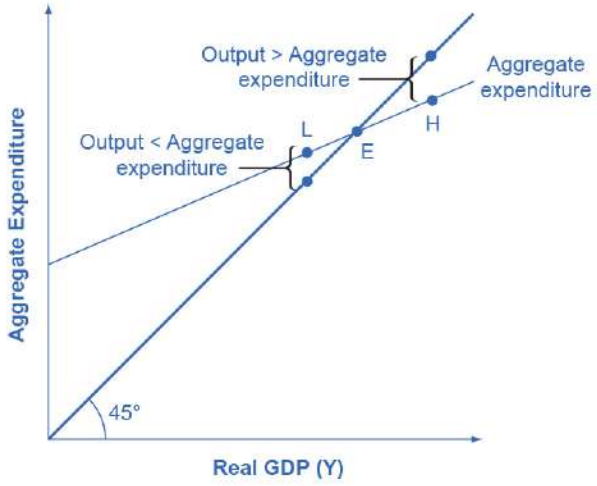


FIGURE D8 Equilibrium in the Keynesian Cross Diagram If output was above the equilibrium level, at H, then the real output is greater than the aggregate expenditure in the economy. This pattern cannot hold, because it would mean that goods are produced but piling up unsold. If output was below the equilibrium level at L, then aggregate expenditure would be greater than output. This pattern cannot hold either, because it would mean that spending exceeds the number of goods being produced. Only point E can be at equilibrium, where output, or national income and aggregate expenditure, are equal. The equilibrium (E) must lie on the 45-degree line, which is the set of points where national income and aggregate expenditure are equal.

Conversely, consider the situation where the level of output is at point L—where real output is lower than the equilibrium. In that case, the level of aggregate demand in the economy is above the 45-degree line, indicating that the level of aggregate expenditure in the economy is greater than the level of output. When the level of aggregate demand has emptied the store shelves, it cannot be sustained, either. Firms will respond by increasing their level of production. Thus, the equilibrium must be the point where the amount produced and

the amount spent are in balance, at the intersection of the aggregate expenditure function and the 45-degree line.

WORK IT OUT

Finding Equilibrium

Table D4 gives some information on an economy. The Keynesian model assumes that there is some level of consumption even without income. That amount is $236 – $216 = $20. $20 will be consumed when national income equals zero. Assume that taxes are 0.2 of real GDP. Let the marginal propensity to save of after-tax income be 0.1. The level of investment is $70, the level of government spending is $80, and the level of exports is $50. Imports are 0.2 of after-tax income. Given these values, you need to complete Table D4 and then answer these questions:

- What is the consumption function?
- What is the equilibrium?
- Why is a national income of $300 not at equilibrium?
- How do expenditures and output compare at this point?

National Income	Taxes	After-tax income	Consumption	I + G + X	Imports	Aggregate Expenditures
$300			$236			
$400						
$500						
$600						
$700						

TABLE D4

Step 1. Calculate the amount of taxes for each level of national income(reminder: GDP = national income) for each level of national income using the following as an example:

National Income (Y)	$300
Taxes = 0.2 or 20%	× 0.2
Tax amount (T)	$60

Step 2. Calculate after-tax income by subtracting the tax amount from national income for each level of national income using the following as an example:

National income minus taxes	$300
	–$60
After-tax income	$240

Step 3. Calculate consumption. The marginal propensity to save is given as 0.1. This means that the marginal propensity to consume is 0.9, since MPS + MPC = 1. Therefore, multiply 0.9 by the after-tax income amount using the following as an example:

After-tax Income	$240
MPC	× 0.9
Consumption	$216

Step 4. Consider why the table shows consumption of $236 in the first row. As mentioned earlier, the Keynesian model assumes that there is some level of consumption even without income. That amount is $236 – $216 = $20.

Step 5. There is now enough information to write the consumption function. The consumption function is found by figuring out the level of consumption that will happen when income is zero. Remember that:

$$C = \text{Consumption when national income is zero} + \text{MPC (after-tax income)}$$

Let C represent the consumption function, Y represent national income, and T represent taxes.

$$\begin{aligned} C &= \$20 + 0.9(Y - T) \\ &= \$20 + 0.9(\$300 - \$60) \\ &= \$236 \end{aligned}$$

Step 6. Use the consumption function to find consumption at each level of national income.

Step 7. Add investment (I), government spending (G), and exports (X). Remember that these do not change as national income changes:

Step 8. Find imports, which are 0.2 of after-tax income at each level of national income. For example:

After-tax income	$240
Imports of 0.2 or 20% of Y – T	× 0.2
Imports	$48

Step 9. Find aggregate expenditure by adding C + I + G + X – I for each level of national income. Your completed table should look like Table D5.

National Income (Y)	Tax = 0.2 × Y (T)	After-tax income (Y – T)	Consumption C = $20 + 0.9(Y – T)	I + G + X	Minus Imports (M)	Aggregate Expenditures AE = C + I + G + X – M
$300	$60	$240	$236	$200	$48	$388
$400	$80	$320	$308	$200	$64	$444
$500	*$100*	*$400*	*$380*	*$200*	*$80*	*$500*
$600	$120	$480	$452	$200	$96	$556
$700	$140	$560	$524	$200	$112	$612

TABLE D5

Step 10. Answer the question: What is equilibrium? Equilibrium occurs where AE = Y. Table D5 shows that equilibrium occurs where national income equals aggregate expenditure at $500.

Step 11. Find equilibrium mathematically, knowing that national income is equal to aggregate expenditure.

$$\begin{aligned} Y &= AE \\ &= C + I + G + X - M \\ &= \$20 + 0.9(Y - T) + \$70 + \$80 + \$50 - 0.2(Y - T) \\ &= \$220 + 0.9(Y - T) - 0.2(Y - T) \end{aligned}$$

Since T is 0.2 of national income, substitute T with 0.2 Y so that:

$$\begin{aligned} Y &= \$220 + 0.9(Y - 0.2Y) - 0.2(Y - 0.2Y) \\ &= \$220 + 0.9Y - 0.18Y - 0.2Y + 0.04Y \\ &= \$220 + 0.56Y \end{aligned}$$

Solve for Y.

$$\begin{aligned} Y &= \$220 + 0.56Y \\ Y - 0.56Y &= \$220 \\ 0.44Y &= \$220 \\ \frac{0.44Y}{0.44} &= \frac{\$220}{0.44} \\ Y &= \$500 \end{aligned}$$

Step 12. Answer this question: Why is a national income of $300 not an equilibrium? At national income of $300, aggregate expenditures are $388.

Step 13. Answer this question: How do expenditures and output compare at this point? Aggregate expenditures cannot exceed output (GDP) in the long run, since there would not be enough goods to be bought.

Recessionary and Inflationary Gaps

In the Keynesian cross diagram, if the aggregate expenditure line intersects the 45-degree line at the level of potential GDP, then the economy is in sound shape. There is no recession, and unemployment is low. But there is no guarantee that the equilibrium will occur at the potential GDP level of output. The equilibrium might be higher or lower.

For example, Figure D9 (a) illustrates a situation where the aggregate expenditure line intersects the 45-degree line at point E_0, which is a real GDP of $6,000, and which is below the potential GDP of $7,000. In this situation, the level of aggregate expenditure is too low for GDP to reach its full employment level, and unemployment will occur. The distance between an output level like E_0 that is below potential GDP and the level of potential GDP is called a recessionary gap. Because the equilibrium level of real GDP is so low, firms will not wish to hire the full employment number of workers, and unemployment will be high.

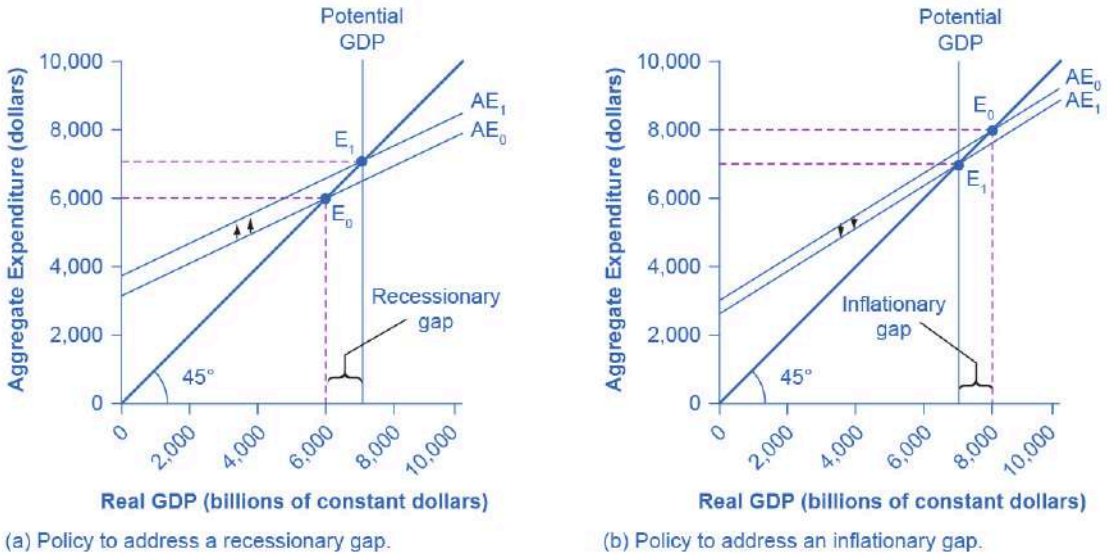


FIGURE D9 Addressing Recessionary and Inflationary Gaps (a) If the equilibrium occurs at an output below potential GDP, then a recessionary gap exists. The policy solution to a recessionary gap is to shift the aggregate

expenditure schedule up from AE_0 to AE_1, using policies like tax cuts or government spending increases. Then the new equilibrium E_1 occurs at potential GDP. (b) If the equilibrium occurs at an output above potential GDP, then an inflationary gap exists. The policy solution to an inflationary gap is to shift the aggregate expenditure schedule down from AE_0 to AE_1, using policies like tax increases or spending cuts. Then, the new equilibrium E_1 occurs at potential GDP.

What might cause a recessionary gap? Anything that shifts the aggregate expenditure line down is a potential cause of recession, including a decline in consumption, a rise in savings, a fall in investment, a drop in government spending or a rise in taxes, or a fall in exports or a rise in imports. Moreover, an economy that is at equilibrium with a recessionary gap may just stay there and suffer high unemployment for a long time; remember, the meaning of equilibrium is that there is no particular adjustment of prices or quantities in the economy to chase the recession away.

The appropriate response to a recessionary gap is for the government to reduce taxes or increase spending so that the aggregate expenditure function shifts up from AE_0 to AE_1. When this shift occurs, the new equilibrium E_1 now occurs at potential GDP as shown in Figure D9 (a).

Conversely, Figure D9 (b) shows a situation where the aggregate expenditure schedule (AE_0) intersects the 45-degree line above potential GDP. The gap between the level of real GDP at the equilibrium E_0 and potential GDP is called an inflationary gap. The inflationary gap also requires a bit of interpreting. After all, a naïve reading of the Keynesian cross diagram might suggest that if the aggregate expenditure function is just pushed up high enough, real GDP can be as large as desired—even doubling or tripling the potential GDP level of the economy. This implication is clearly wrong. An economy faces some supply-side limits on how much it can produce at a given time with its existing quantities of workers, physical and human capital, technology, and market institutions.

The inflationary gap should be interpreted, not as a literal prediction of how large real GDP will be, but as a statement of how much extra aggregate expenditure is in the economy beyond what is needed to reach potential GDP. An inflationary gap suggests that because the economy cannot produce enough goods and services to absorb this level of aggregate expenditures, the spending will instead cause an inflationary increase in the price level. In this way, even though changes in the price level do not appear explicitly in the Keynesian cross equation, the notion of inflation is implicit in the concept of the inflationary gap.

The appropriate Keynesian response to an inflationary gap is shown in Figure D9 (b). The original intersection of aggregate expenditure line AE_0 and the 45-degree line occurs at $8,000, which is above the level of potential GDP at $7,000. If AE_0 shifts down to AE_1, so that the new equilibrium is at E_1, then the economy will be at potential GDP without pressures for inflationary price increases. The government can achieve a downward shift in aggregate expenditure by increasing taxes on consumers or firms, or by reducing government expenditures.

The Multiplier Effect

The Keynesian policy prescription has one final twist. Assume that for a certain economy, the intersection of the aggregate expenditure function and the 45-degree line is at a GDP of 700, while the level of potential GDP for this economy is $800. By how much does government spending need to be increased so that the economy reaches the full employment GDP? The obvious answer might seem to be $800 – $700 = $100; so raise government spending by $100. But that answer is incorrect. A change of, for example, $100 in government expenditures will have an effect of more than $100 on the equilibrium level of real GDP. The reason is that a change in aggregate expenditures circles through the economy: households buy from firms, firms pay workers and suppliers, workers and suppliers buy goods from other firms, those firms pay their workers and suppliers, and so on. In this way, the original change in aggregate expenditures is actually spent more than once. This is called the multiplier effect: An initial increase in spending, cycles repeatedly through the economy and has a larger impact than the initial dollar amount spent.

How Does the Multiplier Work?

To understand how the multiplier effect works, return to the example in which the current equilibrium in the Keynesian cross diagram is a real GDP of $700, or $100 short of the $800 needed to be at full employment, potential GDP. If the government spends $100 to close this gap, someone in the economy receives that spending and can treat it as income. Assume that those who receive this income pay 30% in taxes, save 10% of after-tax income, spend 10% of total income on imports, and then spend the rest on domestically produced goods and services.

As shown in the calculations in Figure D10 and Table D6, out of the original $100 in government spending, $53 is left to spend on domestically produced goods and services. That $53 which was spent, becomes income to someone, somewhere in the economy. Those who receive that income also pay 30% in taxes, save 10% of after-tax income, and spend 10% of total income on imports, as shown in Figure D10, so that an additional $28.09 (that is, 0.53 × $53) is spent in the third round. The people who receive that income then pay taxes, save, and buy imports, and the amount spent in the fourth round is $14.89 (that is, 0.53 × $28.09).

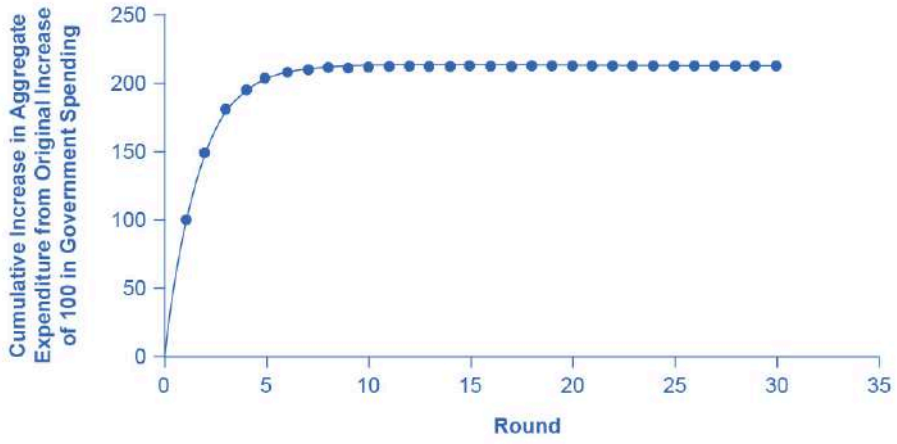


FIGURE D10 The Multiplier Effect An original increase of government spending of $100 causes a rise in aggregate expenditure of $100. But that $100 is income to others in the economy, and after they save, pay taxes, and buy imports, they spend $53 of that $100 in a second round. In turn, that $53 is income to others. Thus, the original government spending of $100 is multiplied by these cycles of spending, but the impact of each successive cycle gets smaller and smaller. Given the numbers in this example, the original government spending increase of $100 raises aggregate expenditure by $213; therefore, the multiplier in this example is $213/$100 = 2.13.

Original increase in aggregate expenditure from government spending	100
Which is income to people throughout the economy: Pay 30% in taxes. Save 10% of after-tax income. Spend 10% of income on imports. Second-round increase of…	70 – 7 – 10 = 53
Which is $53 of income to people through the economy: Pay 30% in taxes. Save 10% of after-tax income. Spend 10% of income on imports. Third-round increase of…	37.1 – 3.71 – 5.3 = 28.09
Which is $28.09 of income to people through the economy: Pay 30% in taxes. Save 10% of after-tax income. Spend 10% of income on imports. Fourth-round increase of…	19.663 – 1.96633 – 2.809 = 14.89

TABLE D6 Calculating the Multiplier Effect

Thus, over the first four rounds of aggregate expenditures, the impact of the original increase in government spending of $100 creates a rise in aggregate expenditures of $100 + $53 + $28.09 + $14.89 = $195.98. Figure D10 shows these total aggregate expenditures after these first four rounds, and then the figure shows the total

aggregate expenditures after 30 rounds. The additional boost to aggregate expenditures is shrinking in each round of consumption. After about 10 rounds, the additional increments are very small indeed—nearly invisible to the naked eye. After 30 rounds, the additional increments in each round are so small that they have no practical consequence. After 30 rounds, the cumulative value of the initial boost in aggregate expenditure is approximately $213. Thus, the government spending increase of $100 eventually, after many cycles, produced an increase of $213 in aggregate expenditure and real GDP. In this example, the multiplier is $213/$100 = 2.13.

Calculating the Multiplier

Fortunately for everyone who is not carrying around a computer with a spreadsheet program to project the impact of an original increase in expenditures over 20, 50, or 100 rounds of spending, there is a formula for calculating the multiplier.

$$\text{Spending Multiplier} = 1/1 - (0.7 \text{ x } (1 - .1) + 0.10) = 1/.63 + .1 = 1/.73 = 1.369$$

The data from Figure D10 and Table D6 is:

- Marginal Propensity to Save (MPS) = 30%
- Tax rate = 10%
- Marginal Propensity to Import (MPI) = 10%

The MPC is equal to 1 – MPS, or 0.7. Therefore, the spending multiplier is:

$$\begin{aligned}\text{Spending Multiplier} &= \frac{1}{1 - (0.7 - (0.10)(0.7) - 0.10)} \\ &= \frac{1}{0.47} \\ &= 2.13\end{aligned}$$

A change in spending of $100 multiplied by the spending multiplier of 2.13 is equal to a change in GDP of $213. Not coincidentally, this result is exactly what was calculated in Figure D10 after many rounds of expenditures cycling through the economy.

The size of the multiplier is determined by what proportion of the marginal dollar of income goes into taxes, saving, and imports. These three factors are known as "leakages," because they determine how much demand "leaks out" in each round of the multiplier effect. If the leakages are relatively small, then each successive round of the multiplier effect will have larger amounts of demand, and the multiplier will be high. Conversely, if the leakages are relatively large, then any initial change in demand will diminish more quickly in the second, third, and later rounds, and the multiplier will be small. Changes in the size of the leakages—a change in the marginal propensity to save, the tax rate, or the marginal propensity to import—will change the size of the multiplier.

Calculating Keynesian Policy Interventions

Returning to the original question: How much should government spending be increased to produce a total increase in real GDP of $100? If the goal is to increase aggregate demand by $100, and the multiplier is 2.13, then the increase in government spending to achieve that goal would be $100/2.13 = $47. Government spending of approximately $47, when combined with a multiplier of 2.13 (which is, remember, based on the specific assumptions about tax, saving, and import rates), produces an overall increase in real GDP of $100, restoring the economy to potential GDP of $800, as Figure D11 shows.

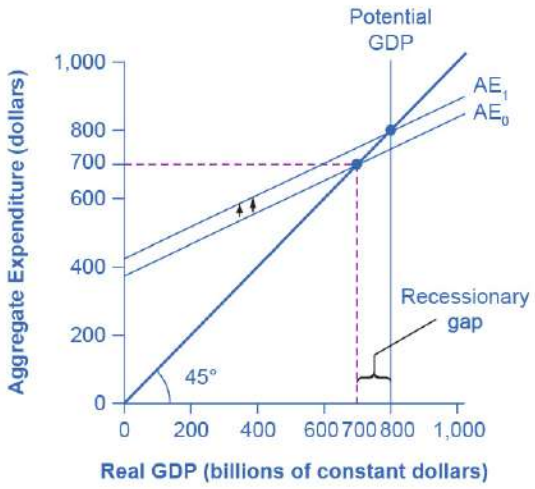


FIGURE D11 The Multiplier Effect in an Expenditure-Output Model The power of the multiplier effect is that an increase in expenditure has a larger increase on the equilibrium output. The increase in expenditure is the vertical increase from AE_0 to AE_1. However, the increase in equilibrium output, shown on the horizontal axis, is clearly larger.

The multiplier effect is also visible on the Keynesian cross diagram. Figure D11 shows the example we have been discussing: a recessionary gap with an equilibrium of $700, potential GDP of $800, the slope of the aggregate expenditure function (AE_0) determined by the assumptions that taxes are 30% of income, savings are 0.1 of after-tax income, and imports are 0.1 of before-tax income. At AE_1, the aggregate expenditure function is moved up to reach potential GDP.

Now, compare the vertical shift upward in the aggregate expenditure function, which is $47, with the horizontal shift outward in real GDP, which is $100 (as these numbers were calculated earlier). The rise in real GDP is more than double the rise in the aggregate expenditure function. (Similarly, if you look back at Figure D9, you will see that the vertical movements in the aggregate expenditure functions are smaller than the change in equilibrium output that is produced on the horizontal axis. Again, this is the multiplier effect at work.) In this way, the power of the multiplier is apparent in the income–expenditure graph, as well as in the arithmetic calculation.

The multiplier does not just affect government spending, but applies to any change in the economy. Say that business confidence declines and investment falls off, or that the economy of a leading trading partner slows down so that export sales decline. These changes will reduce aggregate expenditures, and then will have an even larger effect on real GDP because of the multiplier effect. Read the following Clear It Up feature to learn how the multiplier effect can be applied to analyze the economic impact of professional sports.

CLEAR IT UP

How can the multiplier be used to analyze the economic impact of professional sports?

Attracting professional sports teams and building sports stadiums to create jobs and stimulate business growth is an economic development strategy adopted by many communities throughout the United States. In his recent article, "Public Financing of Private Sports Stadiums," James Joyner of *Outside the Beltway* looked at public financing for NFL teams. Joyner's findings confirm the earlier work of John Siegfried of Vanderbilt University and Andrew Zimbalist of Smith College.

Siegfried and Zimbalist used the multiplier to analyze this issue. They considered the amount of taxes paid and dollars spent locally to see if there was a positive multiplier effect. Since most professional athletes and owners of sports teams are rich enough to owe a lot of taxes, let's say that 40% of any marginal income they earn is paid in

taxes. Because athletes are often high earners with short careers, let's assume that they save one-third of their after-tax income.

However, many professional athletes do not live year-round in the city in which they play, so let's say that one-half of the money that they do spend is spent outside the local area. One can think of spending outside a local economy, in this example, as the equivalent of imported goods for the national economy.

Now, consider the impact of money spent at local entertainment venues other than professional sports. While the owners of these other businesses may be comfortably middle-income, few of them are in the economic stratosphere of professional athletes. Because their incomes are lower, so are their taxes; say that they pay only 35% of their marginal income in taxes. They do not have the same ability, or need, to save as much as professional athletes, so let's assume their MPC is just 0.8. Finally, because more of them live locally, they will spend a higher proportion of their income on local goods—say, 65%.

If these general assumptions hold true, then money spent on professional sports will have less local economic impact than money spent on other forms of entertainment. For professional athletes, out of a dollar earned, 40 cents goes to taxes, leaving 60 cents. Of that 60 cents, one-third is saved, leaving 40 cents, and half is spent outside the area, leaving 20 cents. Only 20 cents of each dollar is cycled into the local economy in the first round. For locally-owned entertainment, out of a dollar earned, 35 cents goes to taxes, leaving 65 cents. Of the rest, 20% is saved, leaving 52 cents, and of that amount, 65% is spent in the local area, so that 33.8 cents of each dollar of income is recycled into the local economy.

Siegfried and Zimbalist make the plausible argument that, within their household budgets, people have a fixed amount to spend on entertainment. If this assumption holds true, then money spent attending professional sports events is money that was not spent on other entertainment options in a given metropolitan area. Since the multiplier is lower for professional sports than for other local entertainment options, the arrival of professional sports to a city would reallocate entertainment spending in a way that causes the local economy to shrink, rather than to grow. Thus, their findings seem to confirm what Joyner reports and what newspapers across the country are reporting. A quick Internet search for "economic impact of sports" will yield numerous reports questioning this economic development strategy.

Multiplier Tradeoffs: Stability versus the Power of Macroeconomic Policy

Is an economy healthier with a high multiplier or a low one? With a high multiplier, any change in aggregate demand will tend to be substantially magnified, and so the economy will be more unstable. With a low multiplier, by contrast, changes in aggregate demand will not be multiplied much, so the economy will tend to be more stable.

However, with a low multiplier, government policy changes in taxes or spending will tend to have less impact on the equilibrium level of real output. With a higher multiplier, government policies to raise or reduce aggregate expenditures will have a larger effect. Thus, a low multiplier means a more stable economy, but also weaker government macroeconomic policy, while a high multiplier means a more volatile economy, but also an economy in which government macroeconomic policy is more powerful.

Key Concepts and Summary

The expenditure-output model or Keynesian cross diagram shows how the level of aggregate expenditure (on the vertical axis) varies with the level of economic output (shown on the horizontal axis). Since the value of all macroeconomic output also represents income to someone somewhere else in the economy, the horizontal axis can also be interpreted as national income. The equilibrium in the diagram will occur where the aggregate expenditure line crosses the 45-degree line, which represents the set of points where aggregate expenditure in the economy is equal to output (or national income). Equilibrium in a Keynesian cross diagram can happen at potential GDP, or below or above that level.

The consumption function shows the upward-sloping relationship between national income and consumption. The marginal propensity to consume (MPC) is the amount consumed out of an additional dollar of income. A higher marginal propensity to consume means a steeper consumption function; a lower marginal propensity to consume means a flatter consumption function. The marginal propensity to save (MPS) is the amount saved out of an additional dollar of income. It is necessarily true that MPC + MPS = 1. The investment function is drawn as a flat line, showing that investment in the current year does not change with regard to the current level of national income. However, the investment function will move up and down based on the expected rate of return in the future. Government spending is drawn as a horizontal line in the Keynesian cross diagram, because its level is determined by political considerations, not by the current level of income in the economy. Taxes in the basic Keynesian cross diagram are taken into account by adjusting the consumption function. The export function is drawn as a horizontal line in the Keynesian cross diagram, because exports do not change as a result of changes in domestic income, but they move as a result of changes in foreign income, as well as changes in exchange rates. The import function is drawn as a downward-sloping line, because imports rise with national income, but imports are a subtraction from aggregate demand. Thus, a higher level of imports means a lower level of expenditure on domestic goods.

In a Keynesian cross diagram, the equilibrium may be at a level below potential GDP, which is called a recessionary gap, or at a level above potential GDP, which is called an inflationary gap.

The multiplier effect describes how an initial change in aggregate demand generated several times as much as cumulative GDP. The size of the spending multiplier is determined by three leakages: spending on savings, taxes, and imports. The formula for the multiplier is:

$$\text{Multiplier} = \frac{1}{1 - (\text{MPC} \times (1 - \text{tax rate}) + \text{MPI})}$$

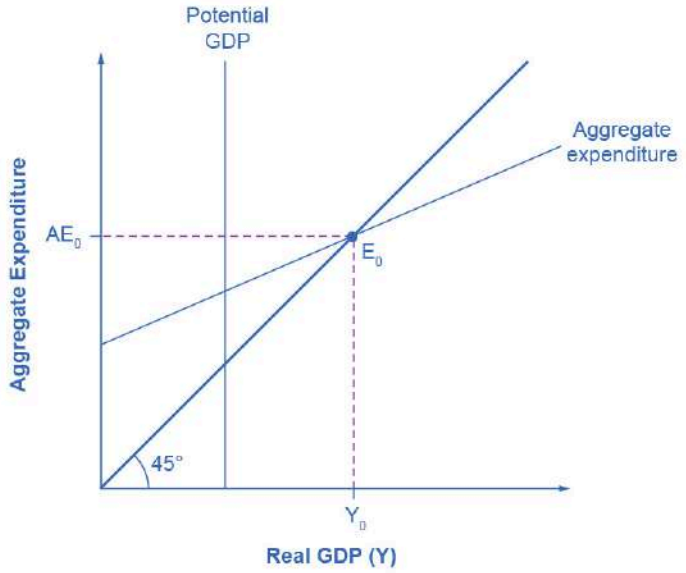
An economy with a lower multiplier is more stable—it is less affected either by economic events or by government policy than an economy with a higher multiplier.

Self-Check Questions

Exercise D1

Sketch the aggregate expenditure-output diagram with the recessionary gap.

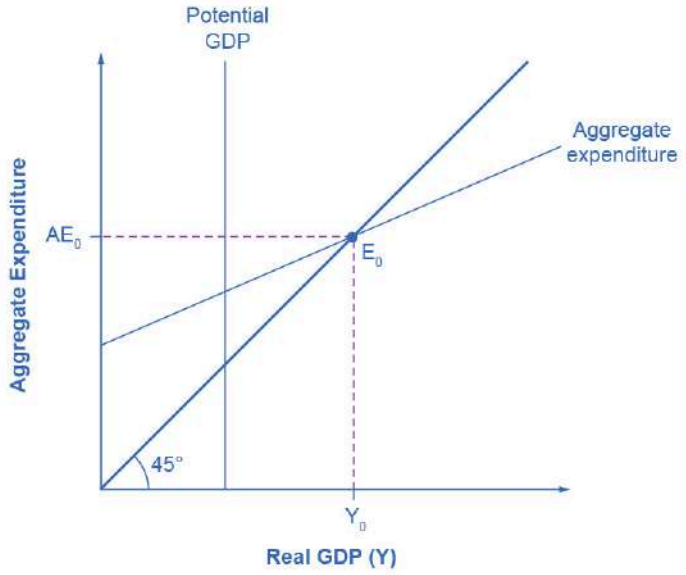
The following figure shows the aggregate expenditure-output diagram with the recessionary gap.



Exercise D2

Sketch the aggregate expenditure-output diagram with an inflationary gap.

The following figure shows the aggregate expenditure-output diagram with an inflationary gap.



Exercise D3
An economy has the following characteristics:

Y = National income

Taxes = T = 0.25Y

C = Consumption = 400 + 0.85(Y – T)

I = 300

G = 200

X = 500

M = 0.1(Y – T)

Find the equilibrium for this economy. If potential GDP is 3,500, then what change in government spending is needed to achieve this level? Do this problem two ways. First, plug 3,500 into the equations and solve for G. Second, calculate the multiplier and figure it out that way.

First, set up the calculation.

$$AE = 400 + 0.85(Y - T) + 300 + 200 + 500 - 0.1(Y - T)$$
$$AE = Y$$

Then insert Y for AE and 0.25Y for T.

$$Y = 400 + 0.85(Y - 0.25Y) + 300 + 200 + 500 - 0.1(Y - 0.25Y)$$
$$Y = 1400 + 0.6375Y - 0.075Y$$
$$0.4375Y = 1400$$
$$Y = 3200$$

If full employment is 3,500, then one approach is to plug in 3,500 for Y throughout the equation, but to leave G as a separate variable.

$$Y = 400 + 0.85(Y - 0.25Y) + 300 + G + 500 + 0.1(Y - 0.25Y)$$
$$3500 = 400 + 0.85(3500 - 0.25(3500)) + 300 + G + 500 - 0.1(3500 - 0.25(3500))$$
$$G = 3500 - 400 - 2231.25 - 1300 - 500 + 262.5$$
$$G = 331.25$$

A G value of 331.25 is an increase of 131.25 from its original level of 200.

Alternatively, the multiplier is that, out of every dollar spent, 0.25 goes to taxes, leaving 0.75, and out of after-tax income, 0.15 goes to savings and 0.1 to imports. Because (0.75)(0.15) = 0.1125 and (0.75)(0.1) = 0.075, this means that out of every dollar spent: 1 –0.25 –0.1125 –0.075 = 0.5625.

Thus, using the formula, the multiplier is:

$$\frac{1}{1-0.5625}=2.2837$$

To increase equilibrium GDP by 300, it will take a boost of 300/2.2837, which again works out to 131.25.

Exercise D4

Table D7 represents the data behind a Keynesian cross diagram. Assume that the tax rate is 0.4 of national income; the MPC out of the after-tax income is 0.8; investment is $2,000; government spending is $1,000; exports are $2,000 and imports are 0.05 of after-tax income. What is the equilibrium level of output for this economy?

National Income	After-tax Income	Consumption	I + G + X	Minus Imports	Aggregate Expenditures
$8,000		$4,340			
$9,000					
$10,000					
$11,000					
$12,000					
$13,000					

TABLE D7

The following table illustrates the completed table. The equilibrium is level is italicized.

National Income	After-tax Income	Consumption	I + G + X	Minus Imports	Aggregate Expenditures
$8,000	$4,800	$4,340	$5,000	$240	$9,100
$9,000	$5,400	$4,820	$5,000	$270	$9,550
$10,000	*$6,000*	*$5,300*	*$5,000*	*$300*	*$10,000*
$11,000	$6,600	$5,780	$5,000	$330	$10,450
$12,000	$7,200	$6,260	$5,000	$360	$10,900
$13,000	$7,800	$6,240	$5,000	$4,390	$11,350

The alternative way of determining equilibrium is to solve for Y, where Y = national income, using: Y = AE = C + I + G + X – M

$$Y = \$500 + 0.8(Y - T) + \$2{,}000 + \$1{,}000 + \$2{,}000 - 0.05(Y - T)$$

Solving for Y, we see that the equilibrium level of output is Y = $10,000.

Exercise D5

Explain how the multiplier works. Use an MPC of 80% in an example.

The multiplier refers to how many times a dollar will turnover in the economy. It is based on the Marginal Propensity to Consume (MPC) which tells how much of every dollar received will be spent. If the MPC is 80% then this means that out of every one dollar received by a consumer, $0.80 will be spent. This $0.80 is received by another person. In turn, 80% of the $0.80 received, or $0.64, will be spent, and so on. The impact of the multiplier is diluted when the effect of taxes and expenditure on imports is considered. To derive the multiplier, take the 1/1 – F; where F is equal to percent of savings, taxes, and expenditures on imports.

Review Questions

Exercise D6
What is on the axes of an expenditure-output diagram?

Exercise D7
What does the 45-degree line show?

Exercise D8
What determines the slope of a consumption function?

Exercise D9
What is the marginal propensity to consume, and how is it related to the marginal propensity to import?

Exercise D10
Why are the investment function, the government spending function, and the export function all drawn as flat lines?

Exercise D11
Why does the import function slope down? What is the marginal propensity to import?

Exercise D12
What are the components on which the aggregate expenditure function is based?

Exercise D13
Is the equilibrium in a Keynesian cross diagram usually expected to be at or near potential GDP?

Exercise D14
What is an inflationary gap? A recessionary gap?

Exercise D15
What is the multiplier effect?

Exercise D16
Why are savings, taxes, and imports referred to as “leakages” in calculating the multiplier effect?

Exercise D17
Will an economy with a high multiplier be more stable or less stable than an economy with a low multiplier in response to changes in the economy or in government policy?

Exercise D18
How do economists use the multiplier?

Critical Thinking Questions

Exercise D19
What does it mean when the aggregate expenditure line crosses the 45-degree line? In other words, how would you explain the intersection in words?

Exercise D20

Which model, the AD/AS or the AE model better explains the relationship between rising price levels and GDP? Why?

Exercise D21
What are some reasons that the economy might be in a recession, and what is the appropriate government action to alleviate the recession?

Exercise D22
What should the government do to relieve inflationary pressures if the aggregate expenditure is greater than potential GDP?

Exercise D23
Two countries are in a recession. Country A has an MPC of 0.8 and Country B has an MPC of 0.6. In which country will government spending have the greatest impact?

Exercise D24
Compare two policies: a tax cut on income or an increase in government spending on roads and bridges. What are both the short-term and long-term impacts of such policies on the economy?

Exercise D25
What role does government play in stabilizing the economy and what are the tradeoffs that must be considered?

Exercise D26
If there is a recessionary gap of $100 billion, should the government increase spending by $100 billion to close the gap? Why? Why not?

Exercise D27
What other changes in the economy can be evaluated by using the multiplier?

References

Joyner, James. Outside the Beltway. “Public Financing of Private Sports Stadiums.” Last modified May 23, 2012. http://www.outsidethebeltway.com/public-financing-of-private-sports-stadiums/.

Siegfried, John J., and Andrew Zimbalist. “The Economics of Sports Facilities and Their Communities.” *Journal of Economic Perspectives*. no. 3 (2000): 95-114. http://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.14.3.95.

ANSWER KEY

Chapter 1

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

Chapter 2

1. The opportunity cost of bus tickets is the number of burgers that must be given up to obtain one more bus ticket. Originally, when the price of bus tickets was 50 cents per trip, this opportunity cost was 0.50/2 = .25 burgers. The reason for this is that at the original prices, one burger ($2) costs the same as four bus tickets ($0.50), so the opportunity cost of a burger is four bus tickets, and the opportunity cost of a bus ticket is .25 burgers (the inverse of the opportunity cost of a burger). With the new, higher price of bus tickets, the opportunity cost rises to $1/$2 or 0.50 burgers. You can see this graphically since the slope of the new budget constraint is steeper than the original one. If Alphonso spends all of his budget on burgers, the higher price of bus tickets has no impact so the vertical intercept of the budget constraint is the same. If he spends his entire budget on bus tickets, he can now afford only half as many, so the horizontal intercept is half as much. In short, the budget constraint rotates clockwise around the vertical intercept, steepening as it goes and the opportunity cost of bus tickets increases.

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

Chapter 3

1. Since $1.60 per gallon is above the equilibrium price, the quantity demanded would be lower at 550 gallons and the quantity supplied would be higher at 640 gallons. (These results are due to the laws of demand and supply, respectively.) The outcome of lower Qd and higher Qs would be a surplus in the gasoline market of 640 – 550 = 90 gallons.
2. To make it easier to analyze complex problems. *Ceteris paribus* allows you to look at the effect of one factor at a time on what it is you are trying to analyze. When you have analyzed all the factors individually, you add the results together to get the final answer.
3. a. An improvement in technology that reduces the cost of production will cause an increase in supply. Alternatively, you can think of this as a reduction in price necessary for firms to supply any quantity. Either way, this can be shown as a rightward (or downward) shift in the supply curve.
   b. An improvement in product quality is treated as an increase in tastes or preferences, meaning consumers demand more paint at any price level, so demand increases or shifts to the right. If this seems counterintuitive, note that demand in the future for the longer-lasting paint will fall, since consumers are essentially shifting demand from the future to the present.
   c. An increase in need causes an increase in demand or a rightward shift in the demand curve.
   d. Factory damage means that firms are unable to supply as much in the present. Technically, this is an increase in the cost of production. Either way you look at it, the supply curve shifts to the left.
4. a. More fuel-efficient cars means there is less need for gasoline. This causes a leftward shift in the demand for gasoline and thus oil. Since the demand curve is shifting down the supply curve, the equilibrium price and quantity both fall.
   b. Cold weather increases the need for heating oil. This causes a rightward shift in the demand for heating oil and thus oil. Since the demand curve is shifting up the supply curve, the equilibrium price and quantity both rise.
   c. A discovery of new oil will make oil more abundant. This can be shown as a rightward shift in the

supply curve, which will cause a decrease in the equilibrium price along with an increase in the equilibrium quantity. (The supply curve shifts down the demand curve so price and quantity follow the law of demand. If price goes down, then the quantity goes up.)

d. When an economy slows down, it produces less output and demands less input, including energy, which is used in the production of virtually everything. A decrease in demand for energy will be reflected as a decrease in the demand for oil, or a leftward shift in demand for oil. Since the demand curve is shifting down the supply curve, both the equilibrium price and quantity of oil will fall.

e. Disruption of oil pumping will reduce the supply of oil. This leftward shift in the supply curve will show a movement up the demand curve, resulting in an increase in the equilibrium price of oil and a decrease in the equilibrium quantity.

f. Increased insulation will decrease the demand for heating. This leftward shift in the demand for oil causes a movement down the supply curve, resulting in a decrease in the equilibrium price and quantity of oil.

g. Solar energy is a substitute for oil-based energy. So if solar energy becomes cheaper, the demand for oil will decrease as consumers switch from oil to solar. The decrease in demand for oil will be shown as a leftward shift in the demand curve. As the demand curve shifts down the supply curve, both equilibrium price and quantity for oil will fall.

h. A new, popular kind of plastic will increase the demand for oil. The increase in demand will be shown as a rightward shift in demand, raising the equilibrium price and quantity of oil.

5. Step 1. Draw the graph with the initial supply and demand curves. Label the initial equilibrium price and quantity.
Step 2. Did the economic event affect supply or demand? Jet fuel is a cost of producing air travel, so an increase in jet fuel price affects supply.
Step 3. An increase in the price of jet fuel caused an increase in the cost of air travel. We show this as an upward or leftward shift in supply.
Step 4. A leftward shift in supply causes a movement up the demand curve, increasing the equilibrium price of air travel and decreasing the equilibrium quantity.

6. Step 1. Draw the graph with the initial supply and demand curves. Label the initial equilibrium price and quantity.
Step 2. Did the economic event affect supply or demand? A tariff is treated like a cost of production, so this affects supply.
Step 3. A tariff reduction is equivalent to a decrease in the cost of production, which we can show as a rightward (or downward) shift in supply.
Step 4. A rightward shift in supply causes a movement down the demand curve, lowering the equilibrium price and raising the equilibrium quantity.

7. A price ceiling (which is below the equilibrium price) will cause the quantity demanded to rise and the quantity supplied to fall. This is why a price ceiling creates a shortage.

8. A price ceiling is just a legal restriction. Equilibrium is an economic condition. People may or may not obey the price ceiling, so the actual price may be at or above the price ceiling, but the price ceiling does not change the equilibrium price.

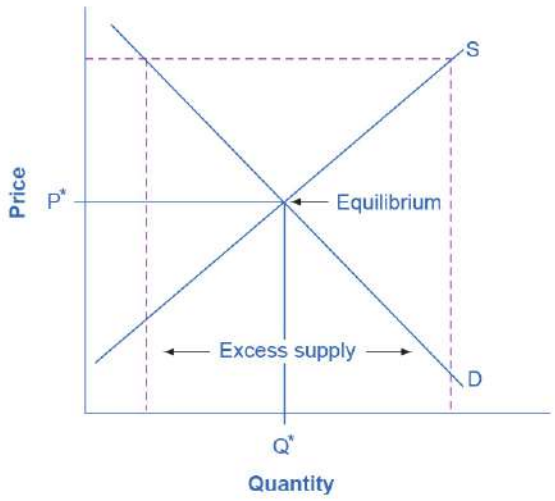
9. A price ceiling is a legal maximum price, but a price floor is a legal minimum price and, consequently, it would leave room for the price to rise to its equilibrium level. In other words, a price floor below equilibrium will not be binding and will have no effect.

10. Assuming that people obey the price ceiling, the market price will be below equilibrium, which means that Qd will be more than Qs. Buyers can only buy what is offered for sale, so the number of transactions will fall to Qs. This is easy to see graphically. By analogous reasoning, with a price floor the market price will be above the equilibrium price, so Qd will be less than Qs. Since the limit on transactions here is demand, the number of transactions will fall to Qd. Note that because both price floors and price ceilings reduce the number of transactions, social surplus is less.

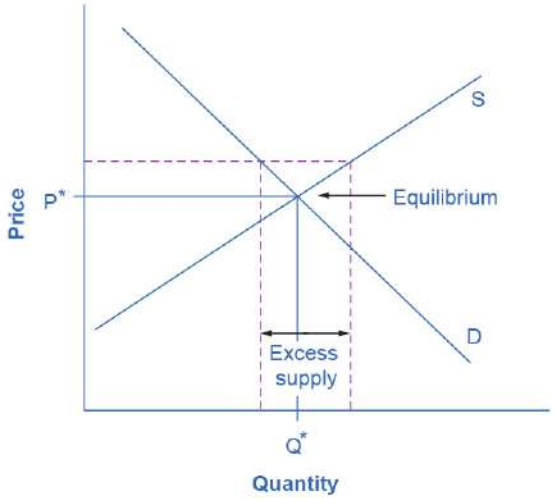
11. Because the losses to consumers are greater than the benefits to producers, so the net effect is negative. Since the lost consumer surplus is greater than the additional producer surplus, social surplus falls.

Chapter 4

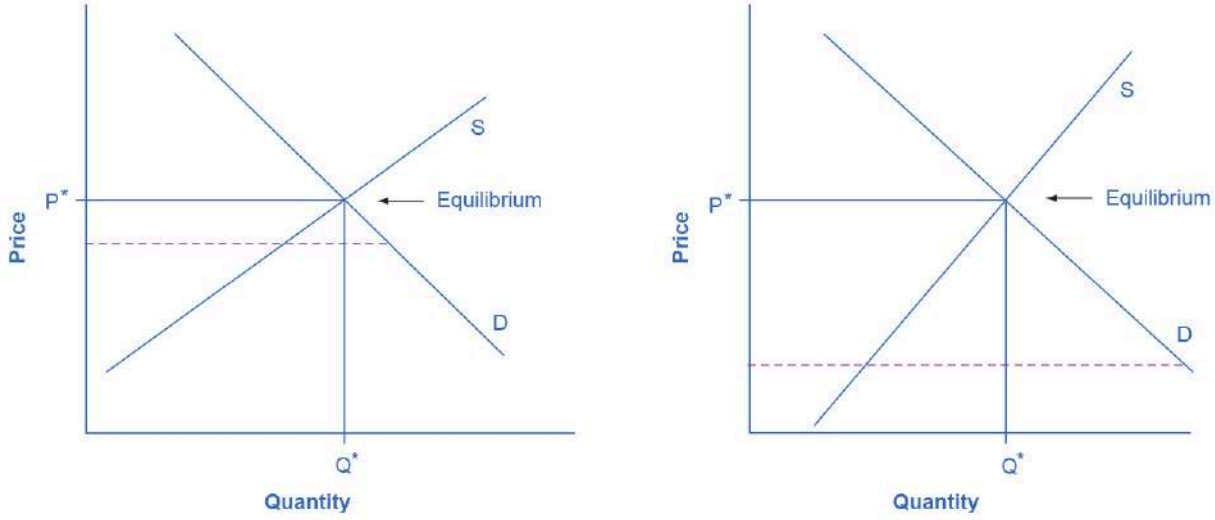
1. Changes in the wage rate (the price of labor) cause a movement along the demand curve. A change in anything else that affects demand for labor (e.g., changes in output, changes in the production process that use more or less labor, government regulation) causes a shift in the demand curve.
2. Changes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



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



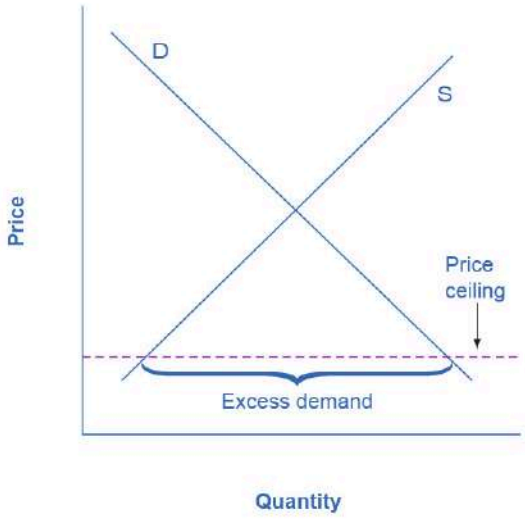
It will have no effect if it is set either slightly or substantially below the equilibrium price, since an equilibrium price above a price floor will not be affected by that price floor. The following figure illustrates these situations.



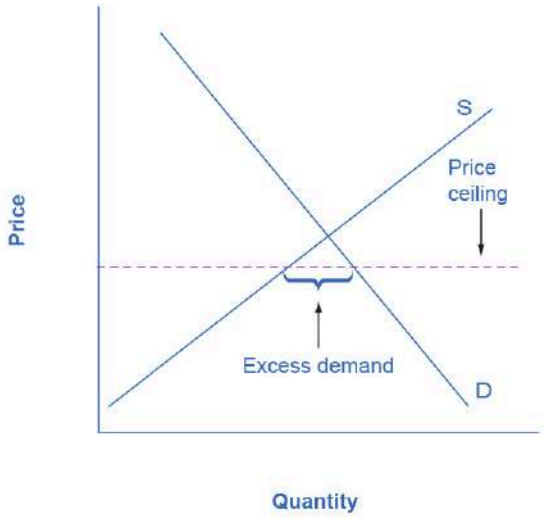
(a) Price floor slightly below equilibrium price

(b) Price floor substantially below equilibrium price

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

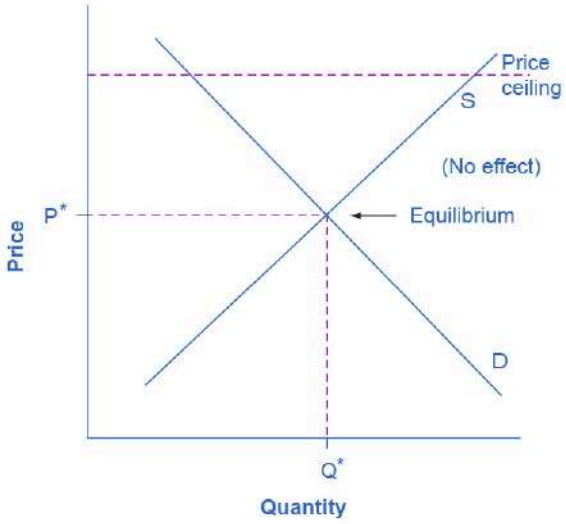


(a) Price ceiling substantially below equilibrium price

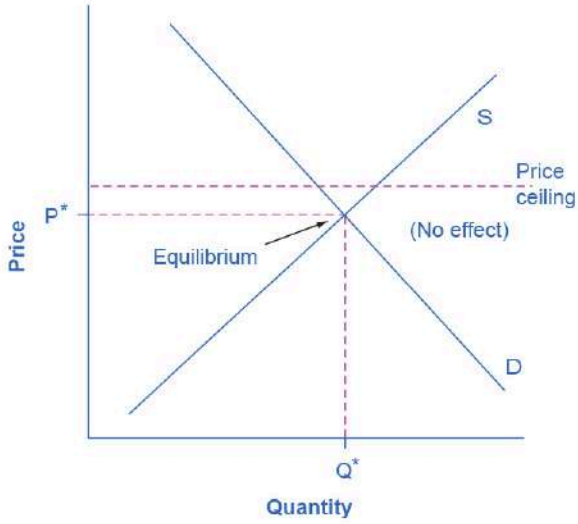


(b) Price ceiling slightly below equilibrium price

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



(a) Price ceiling substantially above equilibrium price



(b) Price ceiling slightly above equilibrium price

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

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

Chapter 5

1. From point B to point C, price rises from $70 to $80, and Qd decreases from 2,800 to 2,600. So:

$$\%\text{ change in quantity} = \frac{2600-2800}{(2600+2800)\div 2} \times 100$$
$$= \frac{-200}{2700} \times 100$$
$$= -7.41$$
$$\%\text{ change in price} = \frac{80-70}{(80+70)\div 2} \times 100$$
$$= \frac{10}{75} \times 100$$
$$= 13.33$$
$$\text{Elasticity of Demand} = \frac{-7.41\%}{13.33\%}$$
$$= 0.56$$

The demand curve is inelastic in this area; that is, its elasticity value is less than one.

Answer from Point D to point E:

$$\%\text{ change in quantity} = \frac{2200-2400}{(2200+2400)\div 2} \times 100$$
$$= \frac{-200}{2300} \times 100$$
$$= -8.7$$
$$\%\text{ change in price} = \frac{100-90}{(100+90)\div 2} \times 100$$
$$= \frac{10}{95} \times 100$$
$$= 10.53$$
$$\text{Elasticity of Demand} = \frac{-8.7\%}{10.53\%}$$
$$= 0.83$$

The demand curve is inelastic in this area; that is, its elasticity value is less than one.

Answer from Point G to point H:

$$\%\text{ change in quantity} = \frac{1600-1800}{1700} \times 100$$
$$= \frac{-200}{1700} \times 100$$
$$= -11.76$$
$$\%\text{ change in price} = \frac{130-120}{125} \times 100$$
$$= \frac{10}{125} \times 100$$
$$= 8.00$$
$$\text{Elasticity of Demand} = \frac{-11.76\%}{8.00\%}$$
$$= -1.47$$

The demand curve is elastic in this interval.

2. From point J to point K, price rises from $8 to $9, and quantity rises from 50 to 70. So:

$$\%\text{ change in quantity} = \frac{70-50}{(70+50)\div 2} \times 100$$
$$= \frac{20}{60} \times 100$$
$$= 33.33$$
$$\%\text{ change in price} = \frac{\$9-\$8}{(\$9+\$8)\div 2} \times 100$$
$$= \frac{1}{8.5} \times 100$$
$$= 11.76$$
$$\text{Elasticity of Supply} = \frac{33.33\%}{11.76\%}$$
$$= 2.83$$

The supply curve is elastic in this area; that is, its elasticity value is greater than one.

From point L to point M, the price rises from $10 to $11, while the Qs rises from 80 to 88:

$$\%\text{ change in quantity} = \frac{88-80}{(88+80)\div 2} \times 100$$
$$= \frac{8}{84} \times 100$$
$$= 9.52$$
$$\%\text{change in price} = \frac{\$11-\$10}{(\$11+\$10)\div 2} \times 100$$
$$= \frac{1}{10.5} \times 100$$
$$= 9.52$$
$$\text{Elasticity of Demand} = \frac{9.52\%}{9.52\%}$$
$$= 1.0$$

The supply curve has unitary elasticity in this area.

From point N to point P, the price rises from $12 to $13, and Qs rises from 95 to 100:

$$\%\text{ change in quantity} = \frac{100-95}{(100+95)\div 2} \times 100$$
$$= \frac{5}{97.5} \times 100$$
$$= 5.13$$
$$\%\text{ change in price} = \frac{\$13-\$12}{(\$13+\$12)\div 2} \times 100$$
$$= \frac{1}{12.5} \times 100$$
$$= 8.0$$
$$\text{Elasticity of Supply} = \frac{5.13\%}{8.0\%}$$
$$= 0.64$$

The supply curve is inelastic in this region of the supply curve.

3. The demand curve with constant unitary elasticity is concave because the absolute value of declines in price are not identical. The left side of the curve starts with high prices, and then price falls by smaller amounts as it goes down toward the right side. This results in a slope of demand that is steeper on the left but flatter on the right, creating a curved, concave shape.
4. The constant unitary elasticity is a straight line because the curve slopes upward and both price and quantity are increasing proportionally.
5. Carmakers can pass this cost along to consumers if the demand for these cars is inelastic. If the demand for these cars is elastic, then the manufacturer must pay for the equipment.
6. If the elasticity is 1.4 at current prices, you would advise the company to lower its price on the product, since a decrease in price will be offset by the increase in the amount of the drug sold. If the elasticity were 0.6, then you would advise the company to increase its price. Increases in price will offset the decrease in number of units sold, but increase your total revenue. If elasticity is 1, the total revenue is already maximized, and you would advise that the company maintain its current price level.
7. The percentage change in quantity supplied as a result of a given percentage change in the price of gasoline.
8. $$\text{Percentage change in quantity demanded} = [(\text{change in quantity})/(\text{original quantity})] \times 100$$
$$= [22 - 30]/[(22 + 30)/2] \times 100$$
$$= -8/26 \times 100$$
$$= -30.77$$
$$\text{Percentage change in income} = [(\text{change in income})/(\text{original income})] \times 100$$
$$= [38{,}000 - 25{,}000]/[(38{,}000 + 25{,}000)/2] \times 100$$
$$= 13/31.5 \times 100$$
$$= 41.27$$

In this example, bread is an inferior good because its consumption falls as income rises.

9. The formula for cross-price elasticity is % change in Qd for apples / % change in P of oranges. Multiplying

both sides by % change in P of oranges yields:
% change in Qd for apples = cross-price elasticity X% change in P of oranges
= 0.4 × (–3%) = –1.2%, or a 1.2 % decrease in demand for apples.

Chapter 6

1. The rows of the table in the problem do not represent the actual choices available on the budget set; that is, the combinations of round trips and phone minutes that Jeremy can afford with his budget. One of the choices listed in the problem, the six round trips, is not even available on the budget set. If Jeremy has only $10 to spend and a round trip costs $2 and phone calls cost $0.05 per minute, he could spend his entire budget on five round trips but no phone calls or 200 minutes of phone calls, but no round trips or any combination of the two in between. It is easy to see all of his budget options with a little algebra. The equation for a budget line is:

$$\text{Budget} = P_{RT} \times Q_{RT} + P_{PC} \times Q_{PC}$$

where P and Q are price and quantity of round trips ($_{RT}$) and phone calls ($_{PC}$) (per minute). In Jeremy's case the equation for the budget line is:

$$\$10 = \$2 \times Q_{RT} + \$.05 \times Q_{PC}$$

$$\frac{\$10}{\$.05} = \frac{\$2Q_{RT} + \$.05Q_{PC}}{\$.05}$$

$$200 = 40Q_{RT} + Q_{PC}$$

$$Q_{PC} = 200 - 40Q_{RT}$$

If we choose zero through five round trips (column 1), the table below shows how many phone minutes can be afforded with the budget (column 3). The total utility figures are given in the table below.

Round Trips	Total Utility for Trips	Phone Minutes	Total Utility for Minutes	Total Utility
0	0	200	1100	1100
1	80	160	1040	1120
2	150	120	900	1050
3	210	80	680	890
4	260	40	380	640
5	300	0	0	300

Adding up total utility for round trips and phone minutes at different points on the budget line gives total utility at each point on the budget line. The highest possible utility is at the combination of one trip and 160 minutes of phone time, with a total utility of 1120.

2. The first step is to use the total utility figures, shown in the table below, to calculate marginal utility, remembering that marginal utility is equal to the change in total utility divided by the change in trips or minutes.

Round Trips	Total Utility	Marginal Utility (per trip)	Phone Minutes	Total Utility	Marginal Utility (per minute)
0	0	-	200	1100	-
1	80	80	160	1040	60/40 = 1.5

Round Trips	Total Utility	Marginal Utility (per trip)	Phone Minutes	Total Utility	Marginal Utility (per minute)
2	150	70	120	900	140/40 = 3.5
3	210	60	80	680	220/40 = 5.5
4	260	50	40	380	300/40 = 7.5
5	300	40	0	0	380/40 = 9.5

Note that we cannot directly compare marginal utilities, since the units are trips versus phone minutes. We need a common denominator for comparison, which is price. Dividing MU by the price, yields columns 4 and 8 in the table below.

Round Trips	Total Utility	Marginal Utility (per trip)	MU/P	Phone Minutes	Total Utility	Marginal utility (per minute)	MU/P
0	0	-	-	200	1100	60/40 = 1.5	1.5/$0.05 = 30
1	80	80	80/$2 = 40	160	1040	140/40 = 3.5	3.5/$0.05 = 70
2	150	70	70/$2 = 35	120	900	220/40 = 5.5	5.5/$0.05 = 110
3	210	60	60/$2 = 30	80	680	300/40 =7.5	7.5/$0.05 = 150
4	260	50	50/$2 = 25	40	380	380/40 = 9.5	9.5/$0.05 = 190
5	300	40	40/$2 = 20	0	0	-	-

Start at the bottom of the table where the combination of round trips and phone minutes is (5, 0). This starting point is arbitrary, but the numbers in this example work best starting from the bottom. Suppose we consider moving to the next point up. At (4, 40), the marginal utility per dollar spent on a round trip is 25. The marginal utility per dollar spent on phone minutes is 190.

Since 25 < 190, we are getting much more utility per dollar spent on phone minutes, so let's choose more of those. At (3, 80), MU/P_{RT} is 30 < 150 (the $MU/_{PM}$), but notice that the difference is narrowing. We keep trading round trips for phone minutes until we get to (1, 160), which is the best we can do. The MU/P comparison is as close as it is going to get (40 vs. 70). Often in the real world, it is not possible to get MU/P exactly equal for both products, so you get as close as you can.

3. This is the opposite of the example explained in the text. A decrease in price has a substitution effect and an income effect. The substitution effect says that because the product is cheaper relative to other things the consumer purchases, the consumer will tend to buy more of the product (and less of the other things). The income effect says that after the price decline, the consumer could purchase the same goods as before, and still have money left over to purchase more. For both reasons, a decrease in price causes an increase in quantity demanded.

4. This is a negative income effect. Because your parents' check failed to arrive, your monthly income is less than normal and your budget constraint shifts in toward the origin. If you only buy normal goods, the decrease in your income means you will buy less of every product.

Chapter 7

1. Accounting profit = total revenues minus explicit costs = $1,000,000 – ($600,000 + $150,000 + $200,000) = $50,000.
2. Economic profit = accounting profit minus implicit cost = $50,000 – $30,000 = $20,000.
3.

Quantity	Variable Cost	Fixed Cost	Total Cost	Average Variable Cost	Average Total Cost	Marginal Cost
0	0	$30	$30	-	-	
1	$10	$30	$40	$10.00	$40.00	$10
2	$25	$30	$55	$12.50	$27.50	$15
3	$45	$30	$75	$15.00	$25.00	$20
4	$70	$30	$100	$17.50	$25.00	$25
5	$100	$30	$130	$20.00	$26.00	$30
6	$135	$30	$165	$22.50	$27.50	$35

4. a. Total revenues in this example will be a quantity of five units multiplied by the price of $25/unit, which equals $125. Total costs when producing five units are $130. Thus, at this level of quantity and output the firm experiences losses (or negative profits) of $5.
   b. If price is less than average cost, the firm is not making a profit. At an output of five units, the average cost is $26/unit. Thus, at a glance you can see the firm is making losses. At a second glance, you can see that it must be losing $1 for each unit produced (that is, average cost of $26/unit minus the price of $25/unit). With five units produced, this observation implies total losses of $5.
   c. When producing five units, marginal costs are $30/unit. Price is $25/unit. Thus, the marginal unit is not adding to profits, but is actually subtracting from profits, which suggests that the firm should reduce its quantity produced.

5. The marginal product of the third painter is 75 square feet.

$$\begin{aligned}\text{marginal product} &= \text{change in total product/change in variable output}\\ &\text{change in total product} = 275 \text{ square feet} - 200 \text{ square feet}\\ &\text{change in total product} = 75 \text{ square feet}\\ \text{marginal product} &= 75 \text{ square feet/1 worker}\\ \text{marginal product} &= 75\end{aligned}$$

6. The new table should look like this:

	Labor Cost	Machine Cost	Total Cost
Cost of technology 1	10 × $40 = $400	2 × $50 = $100	$500
Cost of technology 2	7 × $40 = $280	4 × $50 = $200	$480
Cost of technology 3	3 × $40 = $120	7 × $50 = $350	$470

The firm should choose production technology 3 since it has the lowest total cost. This makes sense since, with cheaper machine hours, one would expect a shift in the direction of more machines and less labor.

7.

	Labor Cost	Machine Cost	Total Cost
Cost of technology 1	10 × $40 = $400	2 × $55 = $110	$510
Cost of technology 2	7 × $40 = $280	4 × $55 = $220	$500
Cost of technology 3	3 × $40 = $120	7 × $55 = $385	$505

The firm should choose production technology 2 since it has the lowest total cost. Because the cost of machines increased (relative to the previous question), you would expect a shift toward less capital and more labor.

8. This is the situation that existed in the United States in the 1970s. Since there is only demand enough for 2.5 firms to reach the bottom of the average cost curve, you would expect one firm will not be around in the long run, and at least one firm will be struggling.

Chapter 8

1. No, you would not raise the price. Your product is exactly the same as the product of the many other firms in the market. If your price is greater than that of your competitors, then your customers would switch to them and stop buying from you. You would lose all your sales.
2. Possibly. Independent truckers are by definition small and numerous. All that is required to get into the business is a truck (not an inexpensive asset, though) and a commercial driver's license. To exit, one need only sell the truck. All trucks are essentially the same, providing transportation from point A to point B. (We're assuming we not talking about specialized trucks.) Independent truckers must take the going rate for their service, so independent trucking does seem to have most of the characteristics of perfect competition.
3. Holding total cost constant, profits at every output level would increase.
4. When the market price increases, marginal revenue increases. The firm would then increase production up to the point where the new price equals marginal cost, at a quantity of 90.
5. If marginal costs exceeds marginal revenue, then the firm will reduce its profits for every additional unit of output it produces. Profit would be greatest if it reduces output to where MR = MC.
6. The firm will be willing to supply fewer units at every price level. In other words, the firm's individual supply curve decreases and shifts to the left.
7. With a technological improvement that brings about a reduction in costs of production, an adjustment process will take place in the market. The technological improvement will result in an increase in supply curves, by individual firms and at the market level. The existing firms will experience higher profits for a while, which will attract other firms into the market. This entry process will stop whenever the market supply increases enough (both by existing and new firms) so profits are driven back to zero.
8. When wages increase, costs of production increase. Some firms would now be making economic losses and would shut down. The supply curve then starts shifting to the left, pushing the market price up. This

process ends when all firms remaining in the market earn zero economic profits. The result is a contraction in the output produced in the market.

9. Perfect competition is considered to be "perfect" because both allocative and productive efficiency are met at the same time in a long-run equilibrium. If a market structure results in long-run equilibrium that does not minimize average total costs and/or does not charge a price equal to marginal cost, then either allocative or productive (or both) efficiencies are not met, and therefore the market cannot be labeled "perfect."
10. Think of the market price as representing the gain to society from a purchase, since it represents what someone is willing to pay. Think of the marginal cost as representing the cost to society from making the last unit of a good. If P > MC, then the benefits from producing more of a good exceed the costs, and society would gain from producing more of the good. If P < MC, then the social costs of producing the marginal good exceed the social benefits, and society should produce less of the good. Only if P = MC, the rule applied by a profit-maximizing perfectly competitive firm, will society's costs and benefits be in balance. This choice will be the option that brings the greatest overall benefit to society.

Chapter 9

1. a. A patent is a government-enforced barrier to entry.
   b. This is not a barrier to entry.
   c. This is not a barrier to entry.
   d. This is a barrier to entry, but it is not government-enforced.
   e. This is a barrier to entry, but it is not directly government enforced.

2. a. This is a government-enforced barrier to entry.
   b. This is an example of a government law, but perhaps it is not much of a barrier to entry if most people can pass the safety test and get insurance.
   c. Trademarks are enforced by government, and therefore are a barrier to entry.
   d. This is probably not a barrier to entry, since there are a number of different ways of getting pure water.
   e. This is a barrier to entry, but it is not government-enforced.

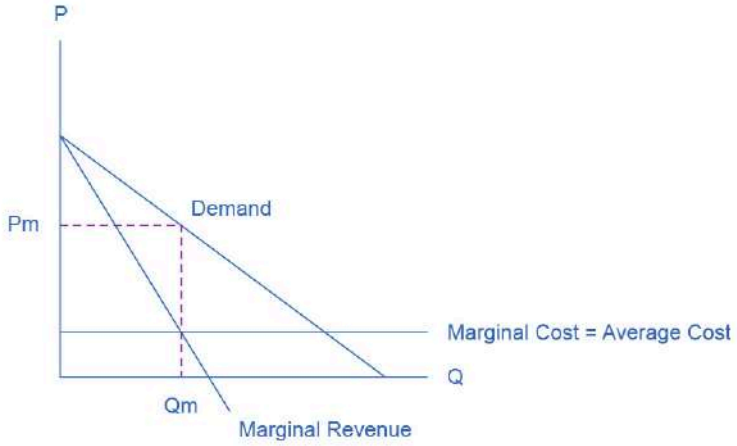
3. Because of economies of scale, each firm would produce at a higher average cost than before. (They would each have to build their own power lines.) As a result, they would each have to raise prices to cover their higher costs. The policy would fail.
4. Shorter patent protection would make innovation less lucrative, so the amount of research and development would likely decline.
5. If price falls below AVC, the firm will not be able to earn enough revenues even to cover its variable costs. In such a case, it will suffer a smaller loss if it shuts down and produces no output. By contrast, if it stayed in operation and produced the level of output where MR = MC, it would lose all of its fixed costs plus some variable costs. If it shuts down, it only loses its fixed costs.
6. This scenario is called "perfect price discrimination." The result would be that the monopolist would produce more output, the same amount in fact as would be produced by a perfectly competitive industry. However, there would be no consumer surplus since each buyer is paying exactly what they think the product is worth. Therefore, the monopolist would be earning the maximum possible profits.

Chapter 10

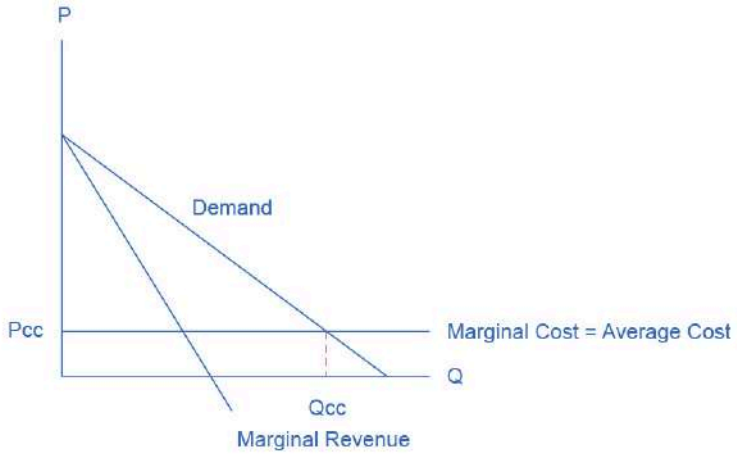
1. An increase in demand will manifest itself as a rightward shift in the demand curve, and a rightward shift in marginal revenue. The shift in marginal revenue will cause a movement up the marginal cost curve to the new intersection between MR and MC at a higher level of output. The new price can be read by drawing a line up from the new output level to the new demand curve, and then over to the vertical axis. The new price should be higher. The increase in quantity will cause a movement along the average cost curve to a possibly higher level of average cost. The price, though, will increase more, causing an increase in total

profits.

2. As long as the original firm is earning positive economic profits, other firms will respond in ways that take away the original firm's profits. This will manifest itself as a decrease in demand for the original firm's product, a decrease in the firm's profit-maximizing price and a decrease in the firm's profit-maximizing level of output, essentially unwinding the process described in the answer to question 1. In the long-run equilibrium, all firms in monopolistically competitive markets will earn zero economic profits.
3. a. If the firms form a cartel, they will act like a monopoly, choosing the quantity of output where MR = MC. Drawing a line from the monopoly quantity up to the demand curve shows the monopoly price. Assuming that fixed costs are zero, and with an understanding of cost and profit, we can infer that when the marginal cost curve is horizontal, average cost is the same as marginal cost. Thus, the cartel will earn positive economic profits equal to the area of the rectangle, with a base equal to the monopoly quantity and a height equal to the difference between price (on the demand above the monopoly quantity) and average cost, as shown in the following figure.



b. The firms will expand output and cut price as long as there are profits remaining. The long-run equilibrium will occur at the point where average cost equals demand. As a result, the oligopoly will earn zero economic profits due to "cutthroat competition," as shown in the next figure.



c. Pc > Pcc. Qc < Qcc. Profit for the cartel is positive and large. Profit for cutthroat competition is zero.

4. Firm B reasons that if it cheats and Firm A does not notice, it will double its money. Since Firm A's profits will decline substantially, however, it is likely that Firm A will notice and if so, Firm A will cheat also, with the result that Firm B will lose 90% of what it gained by cheating. Firm A will reason that Firm B is unlikely to risk cheating. If neither firm cheats, Firm A earns $1000. If Firm A cheats, assuming Firm B does not cheat, A can boost its profits only a little, since Firm B is so small. If both firms cheat, then Firm A loses at least 50% of what it could have earned. The possibility of a small gain ($50) is probably not enough to

induce Firm A to cheat, so in this case it is likely that both firms will collude.

Chapter 11

1. Yes, it is true. The HHI example is easy enough: since the market shares of all firms are included in the HHI calculation, a merger between two of the firms will change the HHI. For the four-firm concentration ratio, it is quite possible that a merger between, say, the fifth and sixth largest firms in the market could create a new firm that is then ranked in the top four in the market. In this case, a merger of two firms, neither in the top four, would still change the four-firm concentration ratio.
2. No, it is not true. The HHI includes the market shares of all firms in its calculation, but the squaring of the market shares has the effect of making the impact of the largest firms relatively bigger than in the 4-firm or 8-firm ratio.
3. The bus companies wanted the broader market definition (i.e., the second definition). If the narrow definition had been used, the combined bus companies would have had a near-monopoly on the market for intercity bus service. But they had only a sliver of the market for intercity transportation when everything else was included. The merger was allowed.
4. The common expectation is that the definition of markets will become broader because of greater competition from faraway places. However, this broadening doesn't necessarily mean that antitrust authorities can relax. There is also a fear that companies with a local or national monopoly may use the new opportunities to extend their reach across national borders, and that it will be difficult for national authorities to respond.
5. Because outright collusion to raise profits is illegal and because existing regulations include gray areas which firms may be able to exploit.
6. Yes, all curves have normal shapes.

7. Yes it is a natural monopoly because average costs decline over the range that satisfies the market demand. For example, at the point where the demand curve and the average cost curve meet, there are economies of scale.
8. Improvements in technology that allowed phone calls to be made via microwave transmission, communications satellites, and other wireless technologies.
9. More consumer choice. Cheaper phone calls, especially long distance. Better-quality phone service in many cases. Cheaper, faster, and better-quality data transmission. Spin-off technologies like free Internet-based calling and video calling.
10. More choice can sometimes make for difficult decisions—not knowing if you got the best plan for your situation, for example. Some phone service providers are less reliable than AT&T used to be.

Chapter 12

1. a. positive externality
b. negative externality
c. positive externality
d. negative externality
e. negative externality

2. a. supply shifts left
b. supply shifts left
c. supply stays the same
d. supply shifts left

3. a. price will rise
b. price will rise
c. price stays the same
d. price will rise.

4. The original equilibrium (before the external social cost of pollution is taken into account) is where the private supply curve crosses the demand curve. This original equilibrium is at a price of $15 and a quantity of 440. After taking into account the additional external cost of pollution, the production becomes more costly, and the supply curve shifts up. The new equilibrium will be at a price of $30 and a quantity of 410.

5. The first policy is command-and-control because it is a requirement that applies to all producers.

6. a. market-based
b. command-and-control
c. command-and-control
d. market-based
e. market-based

7. Even though state or local governments impose these taxes, a company has the flexibility to adopt technologies that will help it avoid the tax.

8. First, if each firm is required to reduce its garbage output by one-fourth, then Elm will reduce five tons at a cost of $5,500; Maple will reduce 10 tons at a cost of $13,500; Oak will reduce three tons at a cost of $22,500; and Cherry will reduce four tons at a cost of $18,000. Total cost of this approach: $59,500. If the system of marketable permits is put in place, and those permits shrink the weight of allowable garbage by one-quarter, then pollution must still be reduced by the same overall amount. However, now the reduction in pollution will take place where it is least expensive.

Reductions in Garbage	Who does the reducing?	At what cost?
First 5 tons	Cherry	$3,000
Second 5 tons	Cherry	$4,000
Third 5 tons	Cherry	$5,000
Fourth 5 tons	Elm	$5,500
Fifth and sixth 5 tons	Elm and Cherry	$6,000 each
Seventh 5 tons	Maple	$6,300

Reductions in Garbage	Who does the reducing?	At what cost?
Eighth 5 tons	Elm	$6,500
Ninth and tenth 5 tons	Elm and Cherry	$7,000 each

Thus, the overall pattern of reductions here will be that Elm reduces garbage by 20 tons and has 15 tons of permits to sell. Maple reduces by five tons and needs to buy five tons of permits. Oak does not reduce garbage at all, and needs to buy 15 tons of permits. Cherry reduces garbage by 25 tons, which leaves it with five tons of permits to sell. The total cost of these reductions would be $56,300, a definite reduction in costs from the $59,500 cost of the command-and-control option.

9.

	Incentives to Go Beyond	Flexibility about Where and How Pollution Will Be Reduced	Political Process Creates Loopholes and Exceptions
Pollution Charges	If you keep reducing pollution you reduce your charge	Reducing pollution by any method is fine	If charge applies to all emissions of pollution then no loopholes
Marketable Permits	If you reduce your pollution you can sell your extra pollution permits	Reductions of pollution will happen at firms where it is cheapest to do so, by the least expensive methods	If all polluters are required to have permits then there are no loopholes
Property Rights	The party that has to pay for the pollution has incentive to do so in a cost effect way	Reducing pollution by any method is fine	If the property rights are clearly defined, then it is not legally possible to avoid cleanup

10. a. See the answers in the following table. The marginal cost is calculated as the change in total cost divided by the change in quantity.

	Total Cost (in thousands of dollars) [marginal cost]	Total Benefits (in thousands of dollars) [marginal benefit]
16 million gallons	Current situation	Current situation
12 million gallons	50 [50]	800 [800]
8 million gallons	150 [100]	1,300 [500]
4 million gallons	500 [350]	1,850 [350]
0 gallons	1,200 [700]	2,000 [150]

b. The “optimal” level of pollution is where the marginal benefits of reducing it are equal to the marginal cost. This is at four million gallons.

c. Marginal analysis tells us if the marginal costs of cleanup are greater than the marginal benefit, society could use those resources more efficiently elsewhere in the economy.

11. a. See the next table for the answers, which were calculated using the traditional calculation of marginal cost equal to change in total cost divided by change in quantity.

Land Restored (in acres)	Total Cost [marginal cost]	Total Benefit [marginal benefit]
0	$0	$0
100	$20 [0.2]	$140 [1.4]
200	$80 [0.6]	$240 [1]
300	$160 [0.8]	$320 [0.8]
400	$280 [1.2]	$480 [0.6]

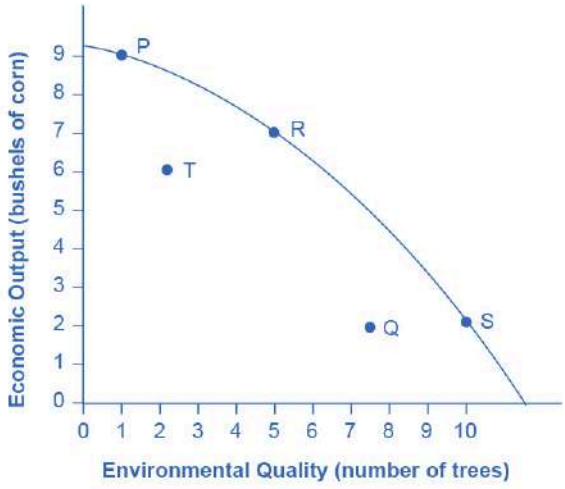
b. The optimal amount of restored land is 300 acres. Beyond this quantity the marginal costs are greater than the marginal benefits.

12.

		Country B	
		Protect	Not Protect
Country A	Protect	Both A and B have a cost of 10 and a benefit of 16; each country has net = 6	A has a cost of 10 and a benefit of 8 (net = −2); B has a cost of 0 and a benefit of 8 (net = 8)
	Not Protect	A has a cost of 0 and a benefit of 8 (net = 8); B has a cost of 10 and a benefit of 8 (net = −2)	Both A and B have a zero cost and a zero benefit; each country has net = 0

Country B will reason this way: If A protects the environment, then we will have benefits of 6 if we act to protect the environment, but 8 if we do not, so we will not protect it. If A is not protecting the environment, we will have losses of 2 if we protect, but have zero if we do not protect, so again, we will not protect it. Country A will reason in a similar manner. The result is that both countries choose to not protect, even though they will achieve the largest social benefits—a combined benefit of 12 for the two countries—if they both choose to protect. Environmental treaties can be viewed as a way for countries to try to extricate themselves from this situation.

13. a.



b. Of the choices provided, P, R, and S demonstrate productive efficiency. These are the choices on the production possibility frontier.

c. Allocative efficiency is determined by the preferences—in this case by the preferences of society as expressed through government and other social institutions. Because you do not have information about these preferences, you really cannot say much about allocative efficiency.

d. In the choice between T and R, R should clearly be preferred, because it has both more corn and more trees. This answer illustrates why productive efficiency is beneficial. Compared with choices inside the PPF, it means more of one or both goods.

e. In the choice between T and S, it is not possible to say which choice is better. True, S is on the PPF and T is not—but that only addresses the issue of productive efficiency. If a society has a strong preference for economic output and places a lower value on trees, then allocative efficiency may lead to a choice of T over S. Of course, the reverse could also be true, leading to a choice of S. Without information on society's preferences to judge allocative efficiency, this question cannot be answered.

f. Compared with command-and-control policies, market-oriented policies allow either more output with the same environmental protection or more environmental protection with the same level of output—or more of both environmental protection and output. Thus, a choice like Q inside the PPF is more likely to represent a command-and-control policy demand than a choice like S on the frontier of the PPF.

Chapter 13

1. No. A market demand curve reflects only the private benefits of those who are consuming the product. Positive externalities are benefits that spill over to third parties, so they create social benefits, and are not captured by a market (or private benefit) demand curve.

2. Clearly Samsung is benefiting from the investment, so the 20% increase in profits is a private benefit. If Samsung is unable to capture all of the benefit, perhaps because other companies quickly copy and produce close substitutes, then Samsung's investment will produce social benefits.

3. a. $102 million.

b. If the interest rate is 9%, the cost of financial capital, and the firm can capture the 5% return to society, the firm would invest as if its effective rate of return is 4%, so it will invest $183 million.

4. When the Junkbuyers Company purchases something for resale, presumably both the buyer and the seller benefit—otherwise, they would not need to make the transaction. However, the company also reduces the amount of garbage produced, which saves money for households and/or for the city that disposes of garbage. So the social benefits are larger than the private benefits.

5. Government programs that either pay for neighborhood clean-up directly or that provide reduced tax payments for those who clean up or fix up their own property could be enacted. It is also easy to imagine how a city might allow its businesses to form a group that would pay for and manage neighborhood cleanup.
6. Government programs that either pay for education directly or that provide loans or reduced tax payments for education could create positive spillovers. A city might allow its businesses to form a group that would coordinate business efforts with schools and local colleges and universities—allowing students to obtain real-world experience in their chosen fields and providing businesses with enthusiastic, trained workers.
7. a. Once citizens are protected from crime, it is difficult to exclude someone from this protection, so it is nonexcludable.
   b. Some satellite radio services, such as SiriusXM, are sold by subscription fee, so it is excludable.
   c. Once a road is built it is difficult to exclude people, although toll roads can exclude non-payers.
   d. Primary education can be provided by private companies and so it is excludable.
   e. Companies sell cell phone service and exclude those who do not pay.
8. a. Two people cannot enjoy the same slice of pizza at the same time, so private goods, such as a slice of pizza, are rivalrous.
   b. Two people cannot use one laptop at the same time, so they are rivalrous in consumption.
   c. Public radio can be heard by anyone with a radio, so many people can listen at the same time—the good is nonrivalrous.
   d. It is difficult for two people to simultaneously eat an ice cream cone, so it is rivalrous in consumption.

Chapter 14

1. a. For a firm operating in a perfectly competitive output market, the value of the marginal product is the marginal product of labor multiplied by the firm's output price.
   b. In a perfectly competitive labor market where the going market wage is $12, a profit-maximizing firm will hire workers up to the point where the market wage equals the marginal revenue product. In this case, the market wage equals the marginal revenue product when the labor is 5 because at that level, the marginal revenue product is $12.
2. a. For firms with some market power in their output market, like a monopoly, the value of additional output sold is the firm's marginal revenue, not the price. This is because they face a downward sloping demand curve for output, which means that in order to sell additional output, the firm must lower its price. The marginal revenue product equals the marginal product of labor multiplied by the marginal revenue.
   b. A profit-maximizing firm will hire workers up to the point where the market wage equals the marginal revenue product. If the going market wage is $20, in this scenario, the profit-maximizing level of employment is 4 because at that point, the marginal revenue product is $20.
3. a. With no union, the equilibrium wage rate would be $18 per hour and there would be 8,000 bus drivers.
   b. If the union has enough negotiating power to raise the wage to $4 per hour higher than under the original equilibrium, the new wage would be $22 per hour. At this wage, 4,000 workers would be demanded while 10,000 would be supplied, leading to an excess supply of 6,000 workers.
4. Unions have sometimes opposed new technology out of a fear of losing jobs, but in other cases unions have helped to facilitate the introduction of new technology because unionized workers felt that the union was looking after their interests or that their higher skills meant that their jobs were essentially protected. And the new technologies meant increased productivity.
5. In a few other countries (such as France and Spain), the percentage of workers belonging to a union is similar to that in the United States. Union membership rates, however, are generally lower in the United States. When the share of workers whose wages are determined by union negotiations is considered, the

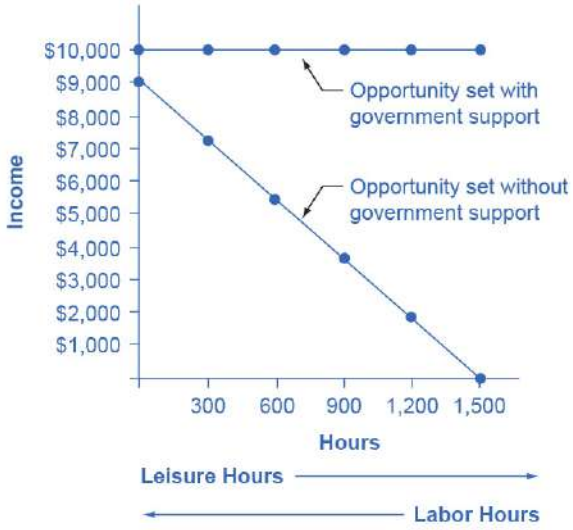
United States ranks by far the lowest (because in countries like France and Spain, union negotiations often determine pay even for nonunion employees).

6. No. While some unions may cause firms to go bankrupt, other unions help firms to become more competitive. No overall pattern exists.
7. From a social point of view, the benefits of unions and the costs seem to counterbalance. There is no evidence that in countries with a higher percentage of unionized workers, the economies grow more or less slowly.
8. a. The marginal cost of labor is the cost to the firm of hiring one more worker. To find the marginal cost of labor, one must divide the change in wage by the change in labor.
   b. Because the monopsonist is the sole employer in the labor market, it can offer any wage that it wishes. However, the marginal cost of labor will be greater than the wage for any number of workers more than one because hiring more than one worker requires paying a higher wage rate for both the new worker and all previous hires. A monopsony will hire workers up to the point where its demand for labor equals the marginal cost of additional labor.
9. a. Firms have a profit incentive to sell to everyone, regardless of race, ethnicity, religion, or gender.
   b. A business that needs to hire workers to expand may also find that if it draws only from its accustomed pool of workers—say, White men—it lacks the workers it needs to expand production. Such a business would have an incentive to hire more women and minorities.
   c. A discriminatory business that is underpaying its workers may find those workers leaving for jobs with another employer who offers better pay. This market pressure could cause the discriminatory business to behave better.
10. No. The earnings gap does not prove discrimination because it does not compare the wages of men and women in the same job who have the same amounts of education, experience, and productivity.
11. If a large share of immigrants have relatively low skills, then reducing the number of immigrants would shift the supply curve of low-skill labor back to the left, which would tend to raise the equilibrium wage for low-skill labor.

Chapter 15

1. a. Poverty falls, inequality rises.
   b. Poverty rises, inequality falls.
2. Jonathon's options for working and total income are shown in the following table. His labor-leisure diagram is shown in the figure following the table.

Number of Work Hours	Earnings from Work	Government Benefits	Total Income
1,500	$9,000	$1,000	$10,000
1,200	$7,200	$2,800	$10,000
900	$5,400	$4,600	$10,000
600	$3,600	$6,400	$10,000
300	$1,800	$8,200	$10,000
0	$0	$10,000	$10,000



3. The following table shows a policy where only 30 cents in government support is pulled right back for every $1 of income earned. Jonathon's labor-leisure diagram is shown in the figure following the table. "Opportunity set after program" extends from (0, $16,300) to (1,500, $10,000). "Opportunity set before program" slopes downward from (0, $9,000) to (1,500, $0).

Number of Work Hours	Earnings from Work	Government Benefits	Total Income
1,500	$9,000	$7,300	$16,300
1,200	$7,200	$7,840	$15,040
900	$5,400	$8,380	$13,780
600	$3,600	$8,920	$12,520
300	$1,800	$9,460	$22,260
0	$0	$10,000	$10,000

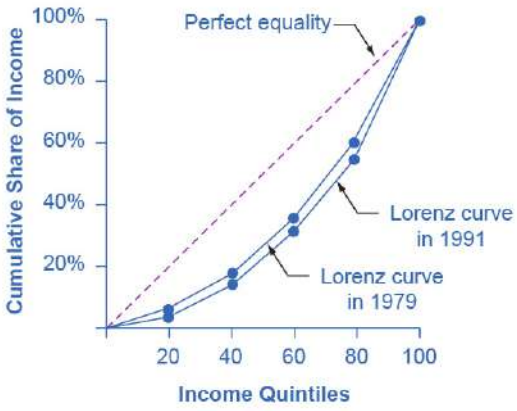
4. The earned income tax credit works like this: a family receives a tax break that increases according to how much they work. Families that work more get more. In that sense it loosens the poverty trap by encouraging work. As families earn above the poverty level, the earned income tax credit is gradually reduced. For those near-poor families, the earned income tax credit is a partial disincentive to work.
5. TANF attempts to loosen the poverty trap by providing incentives to work in other ways. Specifically, it requires that people work (or complete their education) as a condition of receiving TANF benefits, and it places a time limit on benefits.

6. A useful first step is to rank the households by income, from lowest to highest. Then, since there are 10 households total, the bottom quintile will be the bottom two households, the second quintile will be the third and fourth households, and so on up to the top quintile. The quintiles and percentage of total income for the data provided are shown in the following table. Comparing this distribution to the U.S. income distribution for 2005, the top quintile in the example has a smaller share of total income than in the U.S. distribution and the bottom quintile has a larger share. This pattern usually means that the income distribution in the example is more equal than the U.S. distribution.

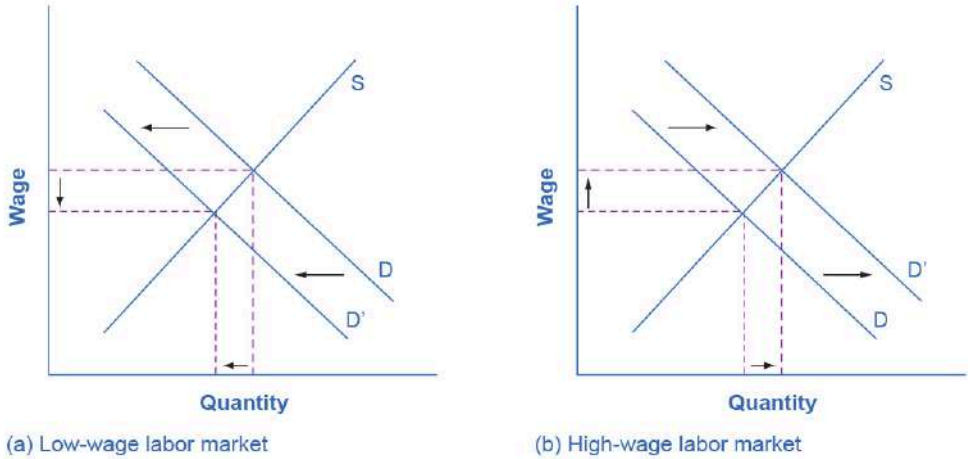
Income	Quintile	% of Total Income
$10,000	Total first quintile income: $22,000	6.0%
$12,000		
$16,000	Total second quintile income: $34,000	9.2%
$18,000		
$24,000	Total third quintile income: $48,000	13.0%
$24,000		
$36,000	Total fourth quintile income: $86,000	23.2%
$50,000		
$80,000	Total top quintile income: $180,000	48.6%
$100,000		
$370,000	**Total Income**	

7. Just from glancing at the quintile information, it is fairly obvious that income inequality increased in the United Kingdom over this time: The top quintile is getting a lot more, and the lowest quintile is getting a bit less. Converting this information into a Lorenz curve, however, is a little trickier, because the Lorenz curve graphs the cumulative distribution, not the amount received by individual quintiles. Thus, as explained in the text, you have to add up the individual quintile data to convert the data to this form. The following table shows the actual calculations for the share of income in 1979 versus 1991. The figure following the table shows the perfect equality line and the Lorenz curves for 1979 and 1991. As shown, the income distribution in 1979 was closer to the perfect equality line than the income distribution in 1991—that is, the United Kingdom income distribution became more unequal over time.

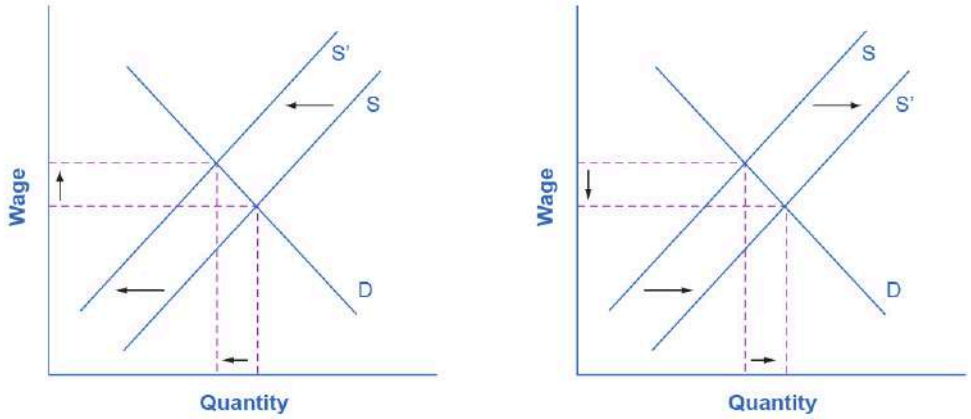
Share of income received	1979	1991
Bottom 20%	7.0%	6.6%
Bottom 40%	18.5%	18.1%
Bottom 60%	35.5%	34.4%
Bottom 80%	60.3%	57.1%
All 100%	100.0%	100.0%



8. In the market for low-wage labor, information technology shifts the demand for low-wage labor to the left. One reason is that technology can often substitute for low-wage labor in certain kinds of telephone or bookkeeping jobs. In addition, information technology makes it easier for companies to manage connections with low-wage workers in other countries, thus reducing the demand for low-wage workers in the United States. In the market for high-wage labor, information technology shifts the demand for high-wage labor to the right. By using the new information and communications technologies, high-wage labor can become more productive and can oversee more tasks than before. The following figure illustrates these two labor markets. The combination of lower wages for low-wage labor and higher wages for high-wage labor means greater inequality.



9. In the market for low-wage labor, a skills program will shift supply to the left, which will tend to drive up wages for the remaining low-skill workers. In the market for high-wage labor, a skills program will shift supply to the right (because after the training program there are now more high-skilled workers at every wage), which will tend to drive down wages for high-skill workers. The combination of these two programs will result in a lesser degree of inequality. The following figure illustrates these two labor markets. In the market for high-wage labor, a skills program will shift supply to the right, which will tend to drive down wages for high-skill workers.



10. A very strong push for economic equality might include extremely high taxes on high-wage earners to pay for extremely large government social payments for people with much lower incomes. Such a policy could limit incentives for the high-wage workers, lock the poor into a poverty trap, and thus reduce output. The PPF in this case will have the standard appearance: it will be downward sloping.

11. For the second hypothesis, a well-funded social safety net might make people feel that even if their company goes bankrupt or they need to change jobs or industries, they will have some degree of protection. As a result, people may be more willing to allow markets to work without interference, and not to lobby as hard for rules that would prevent layoffs, set price controls, or block foreign trade. In this case, safety net programs that increase equality could also allow the market to work more freely in a way that could increase output. In this case, at least some portion of the PPF between equality and economic output would slope up.

12. Pure redistribution is more likely to cause a sharp tradeoff between economic output and equality than policies aimed at the ladder of opportunity. A production possibility frontier showing a strict tradeoff between economic output and equality will be downward sloping. A PPF showing that it is possible to increase equality, at least to some extent, while either increasing output or at least not diminishing it would have a PPF that first rises, perhaps has a flat area, and then falls.

13. Many view the redistribution of income to achieve greater equality as taking away from the rich to pay the poor, or as a "zero sum" game. By taking taxes from one group of people and redistributing them to another, the tax system is robbing some of the American Dream.

Chapter 16

1. a. Imperfect information is relatively low; after all, you can see the apples.
b. Imperfect information is relatively low. The neighborhood restaurant probably has a certain local reputation.
c. Imperfect information is relatively high. How can you tell whether the computer is really in good working order? Why are they selling it?
d. Imperfect information is relatively high. What do those flowers really look like?

2. Asymmetric information often exists in the labor market because employers cannot observe many key employee attributes until after the person is hired. Employees, however, know whether they are energetic or detailed-oriented. Employers, therefore, often seek schools to pre-screen candidates. Employers may not even interview a candidate unless he has a degree and often a degree from a particular school. Employers may also view awards, a high grade point average, and other accolades as a signal of hard work, perseverance, and ability. Finally, employers seek references for insights into key attributes such as energy level, work ethic, and so on.

3. It is almost impossible to distinguish whether a health outcome such as life expectancy was the result of personal preferences that might affect health and longevity, such as diet, exercise, certain risky behavior, and consumption of certain items like tobacco, or the result of expenditures on health care (for example, annual check-ups).

Chapter 17

1. a. The management of small companies might rather do an IPO right away, but until they get the company up and running, most people would not pay very much for the stock because of the risks involved.
   b. A small company may be earning few or zero profits, and its owners want to reinvest their earnings in the future growth of the company. If this company issues bonds or borrows money, it is obligated to make interest payments, which can eat up the company's cash. If the company issues stock, it is not obligated to make payments to anyone (although it may choose to pay dividends).
   c. Venture capitalists are private investors who can keep close tabs on the management and strategy of the company—and thus reduce the problems of imperfect information about whether the firm is being well run. Venture capitalists often own a substantial portion of the firm and have much better information than a typical shareholder would.
2. From a firm's point of view, a bond is very similar to a bank loan. Both are ways of borrowing money. Both require paying interest. The major difference is who must be persuaded to lend money: a bank loan requires persuading the bank, while issuing bonds requires persuading a number of separate bondholders. Since a bank often knows a great deal about a firm (especially if the firm has its accounts with that bank), bank loans are more common where imperfect information would otherwise be a problem.
3. a. Remember, equity is the market value of the house minus what is still owed to the bank. Thus: the value of the house is $200,000, Fred owes $180,000 to the bank, and his equity is $20,000.
   b. The value of Freda's house is $250,000. It does not matter what price she bought it for. She owes zero to the bank, so her equity is the whole $250,000.
   c. The value of Frank's house is $160,000. He owes $60,000 to the bank (the original $80,000 minus the $20,000 he has paid off the loan). His equity is $100,000.
4. Over a sustained period of time, stocks have an average return higher than bonds, and bonds have an average return higher than a savings account. This is because in any given year the value of a savings account changes very little. In contrast, stock values can grow or decline by a very large amount (for example, the S&P 500 increased 26% in 2009 after declining 37% in 2008. The value of a bond, which depends largely on interest rate fluctuations, varies far less than a stock, but more than a savings account.
5. When people believe that a high-risk investment must have a low return, they are getting confused between what risk and return mean. Yes, a high-risk investment might have a low return, but it might also have a high return. Risk refers to the fact that a wide range of outcomes is possible. However, a high-risk investment must, on average, expect a relatively high return or else no one would be willing to take the risk. Thus, it is quite possible—even likely—for an investment to have high risk and high return. Indeed, the reason that an investment has a high expected return is that it also has a high risk.
6. Principal + (principal × rate × time)
   $5,000 + ($5,000 × 0.06 × 3) = $5,900
7. Principal + (principal × rate × time); Interest = Principal × rate × time; $500 = $10,000 × rate × 5 years; $500 = $50,000 × rate; $500/$50,000 = rate; Rate = 1%
8. Principal(1 + interest rate)^{time} = $1,000(1+0.02)^5 =$1,104.08

Chapter 18

1. All other things being equal, voter turnout should increase as the cost of casting an informed vote

decreases.

2. The cost in time of voting, transportation costs to and from the polling place, and any additional time and effort spent becoming informed about the candidates.
3. The costs of organization and the small benefit to the individual.
4. Domestic cotton producers would lobby heavily to protect themselves from the competition, whereas the consumers have little incentive to organize.
5. True. This is exactly what occurs in a voting cycle. That is, the majority can prefer policy A to policy B, policy B to policy C, but also prefer policy C to policy A. Then, the majority will never reach a conclusive outcome.
6. The problem is an example of a voting cycle. The group will vote for mountain biking over canoeing by 2–1. It will vote for canoeing over the beach by 2–1. If mountain biking is preferred to canoeing and canoeing is preferred to the beach, it might seem that it must be true that mountain biking is the favorite. But in a vote of the beach versus mountain biking, the beach wins by a 2–1 vote. When a voting cycle occurs, choosing a single favorite that is always preferred by a majority becomes impossible.
7. The four Coca-Cola candidates compete with each other for Coca-Cola voters, whereas everyone who prefers Pepsi had only one candidate to vote for. Thus the will of the majority is not satisfied.

Chapter 19

1. GDP is C + I + G + (X – M). GDP = $2,000 billion + $50 billion + $1,000 billion + ($20 billion – $40 billion) = $3,030
2. a. Hospital stays are part of GDP.
   b. Changes in life expectancy are not market transactions and not part of GDP.
   c. Child care that is paid for is part of GDP.
   d. If Grandma gets paid and reports this as income, it is part of GDP, otherwise not.
   e. A used car is not produced this year, so it is not part of GDP.
   f. A new car is part of GDP.
   g. Variety does not count in GDP, where the cheese could all be cheddar.
   h. The iron is not counted because it is an intermediate good.
3. From 1980 to 1990, real GDP grew by (8,225.0 – 5,926.5) / (5,926.5) = 39%. Over the same period, prices increased by (72.7 – 48.3) / (48.3/100) = 51%. So about 57% of the growth 51 / (51 + 39) was inflation, and the remainder: 39 / (51 + 39) = 43% was growth in real GDP.
4. Two other major recessions are visible in the figure as slight dips: those of 1973–1975, and 1981–1982. Two other recessions appear in the figure as a flattening of the path of real GDP. These were in 1990–1991 and 2001.
5. 11 recessions in approximately 70 years averages about one recession every six years.
6. The table lists the “Months of Contraction” for each recession. Averaging these figures for the post-WWII recessions gives an average duration of 11 months, or slightly less than a year.
7. The table lists the “Months of Expansion.” Averaging these figures for the post-WWII expansions gives an average expansion of 60.5 months, or more than five years.
8. Yes. The answer to both questions depends on whether GDP is growing faster or slower than population. If population grows faster than GDP, GDP increases, while GDP per capita decreases. If GDP falls, but population falls faster, then GDP decreases, while GDP per capita increases.
9. Start with Central African Republic’s GDP measured in francs. Divide it by the exchange rate to convert to U.S. dollars, and then divide by population to obtain the per capita figure. That is, 1,107,689 million francs / 284.681 francs per dollar / 4.862 million people = $800.28 GDP per capita.
10. a. A dirtier environment would reduce the broad standard of living, but not be counted in GDP, so a rise in GDP would overstate the standard of living.
    b. A lower crime rate would raise the broad standard of living, but not be counted directly in GDP, and so

a rise in GDP would understate the standard of living.

c. A greater variety of goods would raise the broad standard of living, but not be counted directly in GDP, and so a rise in GDP would understate the rise in the standard of living.

d. A decline in infant mortality would raise the broad standard of living, but not be counted directly in GDP, and so a rise in GDP would understate the rise in the standard of living.

Chapter 20

1. The Industrial Revolution refers to the widespread use of power-driven machinery and the economic and social changes that resulted in the first half of the 1800s. Ingenious machines—the steam engine, the power loom, and the steam locomotive—performed tasks that would have taken vast numbers of workers to do. The Industrial Revolution began in Great Britain, and soon spread to the United States, Germany, and other countries.
2. Property rights are the rights of individuals and firms to own property and use it as they see fit. Contractual rights are based on property rights and they allow individuals to enter into agreements with others regarding the use of their property providing recourse through the legal system in the event of noncompliance. Economic growth occurs when the standard of living increases in an economy, which occurs when output is increasing and incomes are rising. For this to happen, societies must create a legal environment that gives individuals the ability to use their property to their fullest and highest use, including the right to trade or sell that property. Without a legal system that enforces contracts, people would not be likely to enter into contracts for current or future services because of the risk of non-payment. This would make it difficult to transact business and would slow economic growth.
3. Yes. Since productivity is output per unit of input, we can measure productivity using GDP (output) per worker (input).
4. In 20 years the United States will have an income of $10{,}000 \times (1 + 0.01)^{20} = \$12{,}201.90$, and South Korea will have an income of $10{,}000 \times (1 + 0.04)^{20} = \$21{,}911.23$. South Korea has grown by a multiple of 2.1 and the United States by a multiple of 1.2.
5. Capital deepening and technology are important. What seems to be more important is how they are combined.
6. Government can contribute to economic growth by investing in human capital through the education system, building a strong physical infrastructure for transportation and commerce, increasing investment by lowering capital gains taxes, creating special economic zones that allow for reduced tariffs, and investing in research and development.
7. Public education, low investment taxes, funding for infrastructure projects, special economic zones
8. A good way to think about this is how a runner who has fallen behind in a race feels psychologically and physically as he catches up. Playing catch-up can be more taxing than maintaining one's position at the head of the pack.
9. a. No. Capital deepening refers to an increase in the amount of capital per person in an economy. A decrease in investment by firms will actually cause the opposite of capital deepening (since the population will grow over time).
   b. There is no direct connection between an increase in international trade and capital deepening. One could imagine particular scenarios where trade could lead to capital deepening (for example, if international capital inflows—which are the counterpart to increasing the trade deficit—lead to an increase in physical capital investment), but in general, no.
   c. Yes. Capital deepening refers to an increase in either physical capital or human capital per person. Continuing education or any time of lifelong learning adds to human capital and thus creates capital deepening.
10. The advantages of backwardness include faster growth rates because of the process of convergence, as well as the ability to adopt new technologies that were developed first in the "leader" countries. While

being "backward" is not inherently a good thing, Gerschenkron stressed that there are certain advantages which aid countries trying to "catch up."

11. Capital deepening, by definition, should lead to diminished returns because you're investing more and more but using the same methods of production, leading to the marginal productivity declining. This is shown on a production function as a movement along the curve. Improvements in technology should not lead to diminished returns because you are finding new and more efficient ways of using the same amount of capital. This can be illustrated as a shift upward of the production function curve.

12. In high-income economies, diminishing returns to investments in physical and human capital may not apply because many high-income economies have developed economic and political institutions that provide a healthy economic climate for an ongoing stream of technological innovations. Continuous technological innovation can counterbalance diminishing returns to investments in human and physical capital. These two factors have the added effect of making additional technological advances even easier for these countries.

As a result, productivity growth from new advances in technology will not increase at a diminishing rate or otherwise slow down because the new methods of production will be adopted relatively quickly and easily, at very low marginal cost.

Chapter 21

1. The population is divided into those "in the labor force" and those "not in the labor force." Thus, the number of adults not in the labor force is 237.8 – 153.9 = 83.9 million. Since the labor force is divided into employed persons and unemployed persons, the number of unemployed persons is 153.9 – 139.1 = 14.8 million. Thus, the adult population has the following proportions:

- 139.1/237.8 = 58.5% employed persons
- 14.8/237.8 = 6.2% unemployed persons
- 83.9/237.8 = 35.3% persons out of the labor force

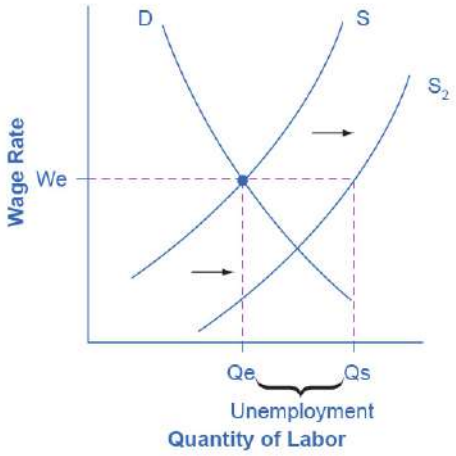
2. The unemployment rate is defined as the number of unemployed persons as a percentage of the labor force or 14.8/153.9 = 9.6%. This is higher than the February 2015 unemployment rate, computed earlier, of 5.5%.

3. Over the long term, the U.S. unemployment rate has remained basically the same level.

4. a. Non-White people
b. The young
c. High school graduates

5. Because of the influx of women into the labor market, the supply of labor shifts to the right. Since wages are sticky downward, the increased supply of labor causes an increase in people looking for jobs (Qs), but no change in the number of jobs available (Qe). As a result, unemployment increases by the amount of the increase in the labor supply. This can be seen in the following figure.

Over time, as labor demand grows, the unemployment will decline and eventually wages will begin to increase again. But this increase in labor demand goes beyond the scope of this problem.



6. The increase in labor supply was a social demographic trend—it was not caused by the economy falling into a recession. Therefore, the influx of women into the work force increased the natural rate of unemployment.
7. New entrants to the labor force, whether from college or otherwise, are counted as frictionally unemployed until they find a job.

Chapter 22

1. To compute the amount spent on each fruit in each year, you multiply the quantity of each fruit by the price.
   - 10 apples × 50 cents each = $5.00 spent on apples in 2001.
   - 12 bananas × 20 cents each = $2.40 spent on bananas in 2001.
   - 2 bunches of grapes at 65 cents each = $1.30 spent on grapes in 2001.
   - 1 pint of raspberries at $2 each = $2.00 spent on raspberries in 2001.

   Adding up the amounts gives you the total cost of the fruit basket. The total cost of the fruit basket in 2001 was $5.00 + $2.40 + $1.30 + $2.00 = $10.70. The total costs for all the years are shown in the following table.

2001	2002	2003	2004
$10.70	$13.80	$15.35	$16.31

2. If 2003 is the base year, then the index number has a value of 100 in 2003. To transform the cost of a fruit basket each year, we divide each year's value by $15.35, the value of the base year, and then multiply the result by 100. The price index is shown in the following table.

2001	2002	2003	2004
69.71	89.90	100.00	106.3

   Note that the base year has a value of 100; years before the base year have values less than 100; and years after have values more than 100.
3. The inflation rate is calculated as the percentage change in the price index from year to year. For example, the inflation rate between 2001 and 2002 is (89.90 – 69.71) / 69.71 = 0.2137 = 28.96%. The inflation rates for all the years are shown in the last row of the following table, which includes the two previous answers.

Items	Qty	(2001) Price	(2001) Amount Spent	(2002) Price	(2002) Amount Spent	(2003) Price	(2003) Amount Spent	(2004) Price	(2004) Amount Spent
Apples	10	$0.50	$5.00	$0.75	$7.50	$0.85	$8.50	$0.88	$8.80
Bananas	12	$0.20	$2.40	$0.25	$3.00	$0.25	$3.00	$0.29	$3.48
Grapes	2	$0.65	$1.30	$0.70	$1.40	$0.90	$1.80	$0.95	$1.90
Raspberries	1	$2.00	$2.00	$1.90	$1.90	$2.05	$2.05	$2.13	$2.13
Total			$10.70		$13.80		$15.35		$16.31
Price Index			69.71		89.90		100.00		106.3
Inflation Rate					28.96%		11.23%		6.3%

4. Begin by calculating the total cost of buying the basket in each time period, as shown in the following table.

Items	Quantity	(Time 1) Price	(Time 1) Total Cost	(Time 2) Price	(Time 2) Total Cost
Gifts	12	$50	$600	$60	$720
Pizza	24	$15	$360	$16	$384
Blouses	6	$60	$360	$50	$300
Trips	2	$400	$800	$420	$840
Total Cost			$2,120		$2,244

The rise in cost of living is calculated as the percentage increase:
(2244 – 2120) / 2120 = 0.0585 = 5.85%.

5. Since the CPI measures the prices of the goods and services purchased by the typical urban consumer, it measures the prices of things that people buy with their paycheck. For that reason, the CPI would be the best price index to use for this purpose.

6. The PPI is subject to those biases for essentially the same reasons as the CPI is. The GDP deflator picks up prices of what is actually purchased that year, so there are no biases. That is the advantage of using the GDP deflator over the CPI.

7. The calculator requires you to input three numbers:

- The first year, in this case the year of your birth
- The amount of money you would want to translate in terms of its purchasing power
- The last year—now or the most recent year the calculator will accept

My birth year is 1955. The amount is $1. The year 2012 is currently the latest year the calculator will accept. The simple purchasing power calculator shows that $1 of purchases in 1955 would cost $8.57 in 2012. The website also explains how the true answer is more complicated than that shown by the simple purchasing power calculator.

8. The state government would benefit because it would repay the loan in less valuable dollars than it borrowed. Plus, tax revenues for the state government would increase because of the inflation.

9. Higher inflation reduces real interest rates on fixed rate mortgages. Because ARMs can be adjusted, higher inflation leads to higher interest rates on ARMs.
10. Because the mortgage has an adjustable rate, the rate should fall by 3%, the same as inflation, to keep the real interest rate the same.

Chapter 23

1. The stock and bond values will not show up in the current account. However, the dividends from the stocks and the interest from the bonds show up as an import to income in the current account.
2. It becomes more negative as imports, which are a negative to the current account, are growing faster than exports, which are a positive.
3. a. Money flows out of the Mexican economy.
   b. Money flows into the Mexican economy.
   c. Money flows out of the Mexican economy.
4. GDP is a dollar value of all production of goods and services. Exports are produced domestically but shipped abroad. The percent ratio of exports to GDP gives us an idea of how important exports are to the national economy out of all goods and services produced. For example, exports represent only 14% of U.S. GDP, but 50% of Germany's GDP
5. Divide $542 billion by $1,800 billion.
6. Divide –$400 billion by $16,800 billion.
7. The trade balance is the difference between exports and imports. The current account balance includes this number (whether it is a trade balance or a trade surplus), but also includes international flows of money from global investments.
8. a. An export sale to Germany involves a financial flow from Germany to the U.S. economy.
   b. The issue here is not U.S. investments in Brazil, but the return paid on those investments, which involves a financial flow from the Brazilian economy to the U.S. economy.
   c. Foreign aid from the United States to Egypt is a financial flow from the United States to Egypt.
   d. Importing oil from the Russian Federation means a flow of financial payments from the U.S. economy to the Russian Federation.
   e. Japanese investors buying U.S. real estate is a financial flow from Japan to the U.S. economy.
9. The top portion tracks the flow of exports and imports and the payments for those. The bottom portion is looking at international financial investments and the outflow and inflow of monies from those investments. These investments can include investments in stocks and bonds or real estate abroad, as well as international borrowing and lending.
10. If more monies are flowing out of the country (for example, to pay for imports) it will make the current account more negative or less positive, and if more monies are flowing into the country, it will make the current account less negative or more positive.
11. Write out the national savings and investment identity for the situation of the economy implied by this question:

$$\text{Supply of capital} = \text{Demand for capital}$$

$$S + (M - X) + (T - G) = I$$

$$\text{Savings} + (\text{trade deficit}) + (\text{government budget surplus}) = \text{Investment}$$

If domestic savings increases and nothing else changes, then the trade deficit will fall. In effect, the economy would be relying more on domestic capital and less on foreign capital. If the government starts borrowing instead of saving, then the trade deficit must rise. In effect, the government is no longer providing savings and so, if nothing else is to change, more investment funds must arrive from abroad. If the rate of domestic investment surges, then, *ceteris paribus*, the trade deficit must also rise, to provide the extra capital. The *ceteris paribus*—or "other things being equal"—assumption is important here. In all

of these situations, there is no reason to expect in the real world that the original change will affect only, or primarily, the trade deficit. The identity only says that something will adjust—it does not specify what.

12. The government is saving rather than borrowing. The supply of savings, whether private or public, is on the left side of the identity.

13. A trade deficit is determined by a country's level of private and public savings and the amount of domestic investment.

14. The trade deficit must increase. To put it another way, this increase in investment must be financed by an inflow of financial capital from abroad.

15. Incomes fall during a recession, and consumers buy fewer good, including imports.

16. A booming economy will increase the demand for goods in general, so import sales will increase. If our trading partners' economies are doing well, they will buy more of our products and so U.S. exports will increase.

17.
a. Increased federal spending on Medicare may not increase productivity, so a budget deficit is not justified.
b. Increased spending on education will increase productivity and foster greater economic growth, so a budget deficit is justified.
c. Increased spending on the space program may not increase productivity, so a budget deficit is not justified.
d. Increased spending on airports and air traffic control will increase productivity and foster greater economic growth, so a budget deficit is justified.

18. Foreign investors worried about repayment so they began to pull money out of these countries. The money can be pulled out of stock and bond markets, real estate, and banks.

19. A rapidly growing trade surplus could result from a number of factors, so you would not want to be too quick to assume a specific cause. However, if the choice is between whether the economy is in recession or growing rapidly, the answer would have to be recession. In a recession, demand for all goods, including imports, has declined; however, demand for exports from other countries has not necessarily altered much, so the result is a larger trade surplus.

20. Germany has a higher level of trade than the United States. The United States has a large domestic economy so it has a large volume of internal trade.

21.
a. A large economy tends to have lower levels of international trade, because it can do more of its trade internally, but this has little impact on its trade imbalance.
b. An imbalance between domestic physical investment and domestic saving (including government and private saving) will always lead to a trade imbalance, but has little to do with the level of trade.
c. Many large trading partners nearby geographically increases the level of trade, but has little impact one way or the other on a trade imbalance.
d. The answer here is not obvious. An especially large budget deficit means a large demand for financial capital which, according to the national saving and investment identity, makes it somewhat more likely that there will be a need for an inflow of foreign capital, which means a trade deficit.
e. A strong tradition of discouraging trade certainly reduces the level of trade. However, it does not necessarily say much about the balance of trade, since this is determined by both imports and exports, and by national levels of physical investment and savings.

Chapter 24

1. In order to supply goods, suppliers must employ workers, whose incomes increase as a result of their labor. They use this additional income to demand goods of an equivalent value to those they supply.

2. When consumers demand more goods than are available on the market, prices are driven higher and the additional opportunities for profit induce more suppliers to enter the market, producing an equivalent amount to that which is demanded.

3. Higher input prices make output less profitable, decreasing the desired supply. This is shown graphically as a leftward shift in the AS curve.
4. Equilibrium occurs at the level of GDP where AD = AS. Insufficient aggregate demand could explain why the equilibrium occurs at a level of GDP less than potential. A decrease (or leftward shift) in aggregate supply could be another reason.
5. Equilibrium real GDP will decrease and the price level will increase.
6. Given the assumptions made here, the cuts in R&D funding should reduce productivity growth. The model would show this as a leftward shift in the SRAS curve, leading to a lower equilibrium GDP and a higher price level.
7. An increase in the value of the stock market would make individuals feel wealthier and thus more confident about their economic situation. This would likely cause an increase in consumer confidence leading to an increase in consumer spending, shifting the AD curve to the right. The result would be an increase in the equilibrium level of GDP and an increase in the price level.
8. Since imports depend on GDP, if Mexico goes into recession, its GDP declines and so do its imports. This decline in our exports can be shown as a leftward shift in AD, leading to a decrease in our GDP and price level.
9. Tax cuts increase consumer and investment spending, depending on where the tax cuts are targeted. This would shift AD to the right, so if the tax cuts occurred when the economy was in recession (and GDP was less than potential), the tax cuts would increase GDP and "lead the economy out of recession."
10. A negative report on home prices would make consumers feel like the value of their homes, which for most Americans is a major portion of their wealth, has declined. A negative report on consumer confidence would make consumers feel pessimistic about the future. Both of these would likely reduce consumer spending, shifting AD to the left, reducing GDP and the price level. A positive report on the home price index or consumer confidence would do the opposite.
11. A smaller labor force would be reflected in a leftward shift in AS, leading to a lower equilibrium level of GDP and higher price level.
12. Higher EU growth would increase demand for U.S. exports, reducing our trade deficit. The increased demand for exports would show up as a rightward shift in AD, causing GDP to rise (and the price level to rise as well). Higher GDP would require more jobs to fulfill, so U.S. employment would also rise.
13. Expansionary monetary policy shifts AD to the right. A continuing expansionary policy would cause larger and larger shifts (given the parameters of this problem). The result would be an increase in GDP and employment (a decrease in unemployment) and higher prices until potential output was reached. After that point, the expansionary policy would simply cause inflation.
14. Since the SRAS curve is vertical in the neoclassical zone, unless the economy is bordering the intermediate zone, a decrease in AS will cause a decrease in the price level, but no effect on real economic activity (for example, real GDP or employment).
15. Because the SRAS curve is horizontal in the Keynesian zone, a decrease in AD should depress real economic activity but have no effect on prices.

Chapter 25

1. a. An increase in home values will increase consumption spending (due to increased wealth). AD will shift to the right and may cause inflation if it goes beyond potential GDP.
   b. Rapid growth by a major trading partner will increase demand for exports. AD will shift to the right and may cause inflation if it goes beyond potential GDP.
   c. Increased profit opportunities will increase business investment. AD will shift to the right and may cause inflation if it goes beyond potential GDP.
   d. Higher interest rates reduce investment spending. AD will shift to the left and may cause recession if it falls below potential GDP.
   e. Demand for cheaper imports increases, reducing demand for domestic products. AD will shift to the

left and may be recessionary.

2. a. A tax increase on consumer income will cause consumption to fall, pushing the AD curve left, and is a possible solution to inflation.
   b. A surge in military spending is an increase in government spending. This will cause the AD curve to shift to the right. If real GDP is less than potential GDP, then this spending would pull the economy out of a recession. If real GDP is to the right of potential GDP, then the AD curve will shift farther to the right and military spending will be inflationary.
   c. A tax cut focused on business investment will shift AD to the right. If the original macroeconomic equilibrium is below potential GDP, then this policy can help move an economy out of a recession.
   d. Government spending on healthcare will cause the AD curve to shift to the right. If real GDP is less than potential GDP, then this spending would pull the economy out of a recession. If real GDP is to th right of potential GDP, then the AD curve will shift farther to the right and healthcare spending will be inflationary.
3. An inflationary gap is the result of an increase in aggregate demand when the economy is at potential output. Since the AS curve is vertical at potential GDP, any increase in AD will lead to a higher price level (i.e. inflation) but no higher real GDP. This is easy to see if you draw AD_1 to the right of AD_0.
4. A decrease in government spending will shift AD to the left.
5. A decrease in energy prices, a positive supply shock, would cause the AS curve to shift out to the right, yielding more real GDP at a lower price level. This would shift the Phillips curve down toward the origin, meaning the economy would experience lower unemployment and a lower rate of inflation.
6. Keynesian economics does not require microeconomic price controls of any sort. It is true that many Keynesian economic prescriptions were for the government to influence the total amount of aggregate demand in the economy, often through government spending and tax cuts.
7. The three problems center on government's ability to estimate potential GDP, decide whether to influence aggregate demand through tax changes or changes in government spending, and the lag time that occurs as Congress and the President attempt to pass legislation.

Chapter 26

1. No, this statement is false. It would be more accurate to say that rational expectations seek to predict the future as accurately as possible, using all of past experience as a guide. Adaptive expectations are largely backward looking; that is, they adapt as experience accumulates, but without attempting to look forward.
2. An unemployment rate of zero percent is presumably well below the rate that is consistent with potential GDP and with the natural rate of unemployment. As a result, this policy would be attempting to push AD out to the right.
   In the short run, it is possible to have unemployment slightly below the natural rate for a time, at a price of higher inflation, as shown by the movement from E_0 to E_1 along the short-run AS curve. However, over time the extremely low unemployment rates will tend to cause wages to be bid up, and shift the short-run AS curve back to the left. The result would be a higher price level, but an economy still at potential GDP and the natural rate of unemployment, as determined by the long-run AS curve. If the government continues this policy, it will continually be pushing the price level higher and higher, but it will not be able to achieve its goal of zero percent unemployment, because that goal is inconsistent with market forces.
3. The statement is accurate. Rational expectations can be thought of as a version of neoclassical economics because it argues that potential GDP and the rate of unemployment are shaped by market forces as wages and prices adjust. However, it is an "extreme" version because it argues that this adjustment takes place very quickly. Other theories, like adaptive expectations, suggest that adjustment to the neoclassical outcome takes a few years.
4. The short-term Keynesian model is built on the importance of aggregate demand as a cause of business cycles and a degree of wage and price rigidity, and thus does a sound job of explaining many recessions

and why cyclical unemployment rises and falls. The neoclassical model emphasizes aggregate supply by focusing on the underlying determinants of output and employment in markets, and thus tends to put more emphasis on economic growth and how labor markets work.

Chapter 27

1. As long as you remain within the walls of the casino, chips fit the definition of money; that is, they serve as a medium of exchange, a unit of account, and a store of value. Chips do not work very well as money once you leave the casino, but many kinds of money do not work well in other areas. For example, it is hard to spend money from Turkey or Brazil at your local supermarket or at the movie theater.
2. Many physical items that a person buys at one time but may sell at another time can serve as an answer to this question. Examples include a house, land, art, rare coins or stamps, and so on.
3. The currency and checks in M1 are easiest to spend. It is harder to spend M2 directly, although if there is an automatic teller machine in the shopping mall, you can turn M2 from your savings account into an M1 of currency quite quickly. If your answer is about "credit cards," then you are really talking about spending M1—although it is M1 from the account of the credit card company, which you will repay later when you credit card bill comes due.
4. a. Neither in M1 or M2
   b. That is part of M1, and because M2 includes M1 it is also part of M2
   c. Currency out in the public hands is part of M1 and M2
   d. Checking deposits are in M1 and M2
   e. Money market accounts are in M2
5. A bank's assets include cash held in their vaults, but assets also include monies that the bank holds at the Federal Reserve Bank (called "reserves"), loans that are made to customers, and bonds.
6. a. A borrower who has been late on a number of loan payments looks perhaps less likely to repay the loan, or to repay it on time, and so you would want to pay less for that loan.
   b. If interest rates generally have risen, then this loan made at a time of relatively lower interest rates looks less attractive, and you would pay less for it.
   c. If the borrower is a firm with a record of high profits, then it is likely to be able to repay the loan, and you would be willing to pay more for the loan.
   d. If interest rates in the economy have fallen, then the loan is worth more.

Chapter 28

1. Longer terms insulate the Board from political forces. Since the presidency can potentially change every four years, the Federal Reserve's independence prevents drastic swings in monetary policy with every new administration and allows policy decisions to be made only on economic grounds.
2. Banks make their money from issuing loans and charging interest. The more money that is stored in the bank's vault, the less is available for lending and the less money the bank stands to make.
3. The fear and uncertainty created by the suggestion that a bank might fail can lead depositors to withdraw their money. If many depositors do this at the same time, the bank may not be able to meet their demands and will, indeed, fail.
4. The bank has to hold $1,000 in reserves, so when it buys the $500 in bonds, it will have to reduce its loans by $500 to make up the difference. The money supply decreases by the same amount.
5. An increase in reserve requirements would reduce the supply of money, since more money would be held in banks rather than circulating in the economy.
6. Contractionary policy reduces the amount of loanable funds in the economy. As with all goods, greater scarcity leads a greater price, so the interest rate, or the price of borrowing money, rises.
7. An increase in the amount of available loanable funds means that there are more people who want to lend. They, therefore, bid the price of borrowing (the interest rate) down.

8. In times of economic uncertainty, banks may worry that borrowers will lose the ability to repay their loans. They may also fear that a panic is more likely and they will need the excess reserves to meet their obligations.
9. If consumer optimism changes, spending can speed up or slow down. This could also happen in a case where consumers need to buy a large number of items quickly, such as in a situation of national emergency.

Chapter 29

1. a. The British use the pound sterling, while Germans use the euro, so a British exporter will receive euros from export sales, which will need to be exchanged for pounds. A stronger euro will mean more pounds per euro, so the exporter will be better off. In addition, the lower price for German imports will stimulate demand for British exports. For both these reasons, a stronger euro benefits the British exporter.
   b. The Dutch use euros while the Chileans use pesos, so the Dutch tourist needs to turn euros into Chilean pesos. An increase in the euro means that the tourist will get more pesos per euro. As a consequence, the Dutch tourist will have a less expensive vacation than he planned, so the tourist will be better off.
   c. The Greek use euros while the Canadians use dollars. An increase in the euro means it will buy more Canadian dollars. As a result, the Greek bank will see a decrease in the cost of the Canadian bonds, so it may purchase more bonds. Either way, the Greek bank benefits.
   d. Since both the French and Germans use the euro, an increase in the euro, in terms of other currencies, should have no impact on the French exporter.
2. Expected depreciation in a currency will lead people to divest themselves of the currency. We should expect to see an increase in the supply of pounds and a decrease in demand for pounds. The result should be a decrease in the value of the pound *vis à vis* the dollar.
3. Lower U.S. interest rates make U.S. assets less desirable compared to assets in the European Union. We should expect to see a decrease in demand for dollars and an increase in supply of dollars in foreign currency markets. As a result, we should expect to see the dollar depreciate compared to the euro.
4. A decrease in Argentine inflation relative to other countries should cause an increase in demand for pesos, a decrease in supply of pesos, and an appreciation of the peso in foreign currency markets.
5. The problem occurs when banks borrow foreign currency but lend in domestic currency. Since banks' assets (loans they made) are in domestic currency, while their debts (money they borrowed) are in foreign currency, when the domestic currency declines, their debts grow larger. If the domestic currency falls substantially in value, as happened during the Asian financial crisis, then the banking system could fail. This problem is unlikely to occur for U.S. banks because, even when they borrow from abroad, they tend to borrow dollars. Remember, there are trillions of dollars in circulation in the global economy. Since both assets and debts are in dollars, a change in the value of the dollar does not cause banking system failure the way it can when banks borrow in foreign currency.
6. While capital flight is possible in either case, if a country borrows to invest in real capital it is more likely to be able to generate the income to pay back its debts than a country that borrows to finance consumption. As a result, an investment-stimulated economy is less likely to provoke capital flight and economic recession.
7. A contractionary monetary policy, by driving up domestic interest rates, would cause the currency to appreciate. The higher value of the currency in foreign exchange markets would reduce exports, since from the perspective of foreign buyers, they are now more expensive. The higher value of the currency would similarly stimulate imports, since they would now be cheaper from the perspective of domestic buyers. Lower exports and higher imports cause net exports (EX – IM) to fall, which causes aggregate demand to fall. The result would be a decrease in GDP working through the exchange rate mechanism reinforcing the effect contractionary monetary policy has on domestic investment expenditure. However,

cheaper imports would stimulate aggregate supply, bringing GDP back to potential, though at a lower price level.

8. For a currency to fall, a central bank need only supply more of its currency in foreign exchange markets. It can print as much domestic currency as it likes. For a currency to rise, a central bank needs to buy its currency in foreign exchange markets, paying with foreign currency. Since no central bank has an infinite amount of foreign currency reserves, it cannot buy its currency indefinitely.
9. Variations in exchange rates, because they change import and export prices, disturb international trade flows. When trade is a large part of a nation's economic activity, government will find it more advantageous to fix exchange rates to minimize disruptions of trade flows.

Chapter 30

1. The government borrows funds by selling Treasury bonds, notes, and bills.
2. The funds can be used to pay down the national debt or else be refunded to the taxpayers.
3. Yes, a nation can run budget deficits and see its debt/GDP ratio fall. In fact, this is not uncommon. If the deficit is small in a given year, than the addition to debt in the numerator of the debt/GDP ratio will be relatively small, while the growth in GDP is larger, and so the debt/GDP ratio declines. This was the experience of the U.S. economy for the period from the end of World War II to about 1980. It is also theoretically possible, although not likely, for a nation to have a budget surplus and see its debt/GDP ratio rise. Imagine the case of a nation with a small surplus, but in a recession year when the economy shrinks. It is possible that the decline in the nation's debt, in the numerator of the debt/GDP ratio, would be proportionally less than the fall in the size of GDP, so the debt/GDP ratio would rise.
4. Progressive. People who give larger gifts subject to the higher tax rate would typically have larger incomes as well.
5. Corporate income tax on his profits, individual income tax on his salary, and payroll tax taken out of the wages he pays himself.
6. individual income taxes
7. The tax is regressive because wealthy income earners are not taxed at all on income above $113,000. As a percent of total income, the social security tax hits lower income earners harder than wealthier individuals.
8. As debt increases, interest payments also rise, so that the deficit grows even if we keep other government spending constant.
9. a. As a share of GDP, this is false. In nominal dollars, it is true.
   b. False.
   c. False.
   d. False. Education spending is much higher at the state level.
   e. False. As a share of GDP, it is up about 50.
   f. As a share of GDP, this is false, and in real dollars, it is also false.
   g. False.
   h. False; it's about 1%.
   i. False. Although budget deficits were large in 2003 and 2004, and continued into the later 2000s, the federal government ran budget surpluses from 1998–2001.
   j. False.
10. To keep prices from rising too much or too rapidly.
11. To increase employment.
12. It falls below because less tax revenue than expected is collected.
13. Automatic stabilizers take effect very quickly, whereas discretionary policy can take a long time to implement.
14. In a recession, because of the decline in economic output, less income is earned, and so less in taxes is automatically collected. Many welfare and unemployment programs are designed so that those who fall

into certain categories, like "unemployed" or "low income," are eligible for benefits. During a recession, more people fall into these categories and become eligible for benefits automatically. The combination of reduced taxes and higher spending is just what is needed for an economy in recession producing below potential GDP. With an economic boom, average income levels rise in the economy, so more in taxes is automatically collected. Fewer people meet the criteria for receiving government assistance to the unemployed or the needy, so government spending on unemployment assistance and welfare falls automatically. This combination of higher taxes and lower spending is just what is needed if an economy is producing above its potential GDP.

15. Prices would be pushed up as a result of too much spending.

16. Employment would suffer as a result of too little spending.

17. Monetary policy probably has shorter time lags than fiscal policy. Imagine that the data becomes fairly clear that an economy is in or near a recession. Expansionary monetary policy can be carried out through open market operations, which can be done fairly quickly, since the Federal Reserve's Open Market Committee meets six times a year. Also, monetary policy takes effect through interest rates, which can change fairly quickly. However, fiscal policy is carried out through acts of Congress that need to be signed into law by the president. Negotiating such laws often takes months, and even after the laws are negotiated, it takes more months for spending programs or tax cuts to have an effect on the macroeconomy.

18. The government would have to make up the revenue either by raising taxes in a different area or cutting spending.

19. Programs where the amount of spending is not fixed, but rather determined by macroeconomic conditions, such as food stamps, would lose a great deal of flexibility if spending increases had to be met by corresponding tax increases or spending cuts.

Chapter 31

1. We use the national savings and investment identity to solve this question. In this case, the government has a budget surplus, so the government surplus appears as part of the supply of financial capital. Then:

$$\text{Quantity supplied of financial capital} = \text{Quantity demanded of financial capital}$$
$$S + (T - G) = I + (X - M)$$
$$600 + 200 = I + 100$$
$$I = 700$$

2. a. Since the government has a budget surplus, the government budget term appears with the supply of capital. The following shows the national savings and investment identity for this economy.

$$\text{Quantity supplied of financial capital} = \text{Quantity demanded of financial capital}$$
$$S + (T - G) = I + (X - M)$$

b. Plugging the given values into the identity shown in part (a), we find that $(X - M) = 0$.

c. Since the government has a budget deficit, the government budget term appears with the demand for capital. You do not know in advance whether the economy has a trade deficit or a trade surplus. But when you see that the quantity demanded of financial capital exceeds the quantity supplied, you know that there must be an additional quantity of financial capital supplied by foreign investors, which means a trade deficit of 2000. This example shows that in this case there is a higher budget deficit, and a higher trade deficit.

$$\text{Quantity supplied of financial capital} = \text{Quantity demanded of financial capital}$$
$$S + (M - X) = I + (G - T)$$
$$4000 + 2000 = 5000 + 1000$$

3. In this case, the national saving and investment identity is written in this way:

$$\text{Quantity supplied of financial capital} = \text{Quantity demanded of financial capital}$$
$$(T - G) + (M - X) + S = I$$

The increase in the government budget surplus and the increase in the trade deficit both increased the supply of financial capital. If investment in physical capital remained unchanged, then private savings must go down, and if savings remained unchanged, then investment must go up. In fact, both effects happened; that is, in the late 1990s, in the U.S. economy, savings declined and investment rose.

4. Ricardian equivalence means that private saving changes to offset exactly any changes in the government budget. So, if the deficit increases by 20, private saving increases by 20 as well, and the trade deficit and the budget deficit will not change from their original levels. The original national saving and investment identity is written below. Notice that if any change in the (G – T) term is offset by a change in the S term, then the other terms do not change. So if (G – T) rises by 20, then S must also increase by 20.

$$\text{Quantity supplied of financial capital} = \text{Quantity demanded of financial capital}$$
$$S + (M - X) = I + (G - T)$$
$$130 + 20 = 100 + 50$$

5. In the last few decades, spending per student has climbed substantially. However, test scores have fallen over this time. This experience has led a number of experts to argue that the problem is not resources—or is not just resources by itself—but is also a problem of how schools are organized and managed and what incentives they have for success. There are a number of proposals to alter the incentives that schools face, but relatively little hard evidence on what proposals work well. Without trying to evaluate whether these proposals are good or bad ideas, you can just list some of them: testing students regularly; rewarding teachers or schools that perform well on such tests; requiring additional teacher training; allowing students to choose between public schools; allowing teachers and parents to start new schools; giving student "vouchers" that they can use to pay tuition at either public or private schools.
6. The government can direct government spending to R&D. It can also create tax incentives for business to invest in R&D.

Chapter 32

1. The answers are shown in the following two tables.

Region	GDP (in millions)
East Asia	$10,450,032
Latin America	$5,339,390
South Asia	$2,288,812
Europe and Central Asia	$1,862,384
Middle East and North Africa	$1,541,900
Sub-Saharan Africa	$1,287,650

Region	GDP Per Capita (in millions)
East Asia	$5,246
Latin America	$1,388
South Asia	$1,415
Europe and Central Asia	$9,190

Region	GDP Per Capita (in millions)
Middle East and North Africa	$4,535
Sub-Saharan Africa	$6,847

East Asia appears to be the largest economy on GDP basis, but on a per capita basis it drops to third, after Europe and Central Asia and Sub-Saharan Africa.

2. A region can have some of high-income countries and some of the low-income countries. Aggregating per capita real GDP will vary widely across countries within a region, so aggregating data for a region has little meaning. For example, if you were to compare per capital real GDP for the United States, Canada, Haiti, and Honduras, it looks much different than if you looked at the same data for North America as a whole. Thus, regional comparisons are broad-based and may not adequately capture an individual country's economic attributes.
3. The following table provides a summary of possible answers.

High-Income Countries	Middle-Income Countries	Low-Income Countries
• Foster a more educated workforce • Create, invest in, and apply new technologies • Adopt fiscal policies focused on investment, including investment in human capital, in technology, and in physical plant and equipment • Create stable and market-oriented economic climate • Use monetary policy to keep inflation low and stable • Minimize the risk of exchange rate fluctuations, while also encouraging domestic and international competition	• Invest in technology, human capital, and physical capital • Provide incentives of a market-oriented economic context • Work to reduce government economic controls on market activities • Deregulate the banking and financial sector • Reduce protectionist policies	• Eradicate poverty and extreme hunger • Achieve universal primary education • Promote gender equality • Reduce child mortality rates • Improve maternal health • Combat HIV/AIDS, malaria, and other diseases • Ensure environmental sustainability • Develop global partnerships for development

4. Low-income countries must adopt government policies that are market-oriented and that educate the workforce and population. After this is done, low-income countries should focus on eradicating other social ills that inhibit their growth. The economically challenged are stuck in poverty traps. They need to focus more on health and education and create a stable macroeconomic and political environment. This will attract foreign aid and foreign investment. Middle-income countries strive for increases in physical capital and innovation, while higher-income countries must work to maintain their economies through innovation and technology.
5. If there is a recession and unemployment increases, we can call on an expansionary fiscal policy (lower taxes or increased government spending) or an expansionary monetary policy (increase the money supply and lower interest rates). Both policies stimulate output and decrease unemployment.
6. Aside from a high natural rate of unemployment due to government regulations, subsistence households

may be counted as not working.

7. Indexing wage contracts means wages rise when prices rise. This means what you can buy with your wages, your standard of living, remains the same. When wages are not indexed, or rise with inflation, your standard of living falls.
8. An increase in government spending shifts the AD curve to the right, raising both income and price levels.
9. A decrease in the money supply will shift the AD curve leftward and reduce income and price levels. Banks will have less money to lend. Interest rates will increase, affecting consumption and investment, which are both key determinants of aggregate demand.
10. Given the high level of activity in international financial markets, it is typically believed that financial flows across borders are the real reason for trade imbalances. For example, the United States had an enormous trade deficit in the late 1990s and early 2000s because it was attracting vast inflows of foreign capital. Smaller countries that have attracted such inflows of international capital worry that if the inflows suddenly turn to outflows, the resulting decline in their currency could collapse their banking system and bring on a deep recession.
11. The demand for the country's currency would decrease, lowering the exchange rate.

Chapter 33

1. False. Anything that leads to different levels of productivity between two economies can be a source of comparative advantage. For example, the education of workers, the knowledge base of engineers and scientists in a country, the part of a split-up value chain where they have their specialized learning, economies of scale, and other factors can all determine comparative advantage.
2. Brazil has the absolute advantage in producing beef and the United States has the absolute advantage in autos. The opportunity cost of producing one pound of beef is 1/10 of an auto; in the United States it is 3/4 of an auto.
3. In answering questions like these, it is often helpful to begin by organizing the information in a table, such as in the following table. Notice that, in this case, the productivity of the countries is expressed in terms of how many workers it takes to produce a unit of a product.

Country	One Sweater	One Bottle of wine
France	1 worker	1 worker
Tunisia	2 workers	3 workers

   In this example, France has an absolute advantage in the production of both sweaters and wine. You can tell because it takes France less labor to produce a unit of the good.
4. a. In Germany, it takes fewer workers to make either a television or a video camera. Germany has an absolute advantage in the production of both goods.
   b. Producing an additional television in Germany requires three workers. Shifting those three German workers will reduce video camera production by 3/4 of a camera. Producing an additional television set in Poland requires six workers, and shifting those workers from the other good reduces output of video cameras by 6/12 of a camera, or 1/2. Thus, the opportunity cost of producing televisions is lower in Poland, so Poland has the comparative advantage in the production of televisions. *Note*: Do not let the fractions like 3/4 of a camera or 1/2 of a video camera bother you. If either country was to expand television production by a significant amount—that is, lots more than one unit—then we will be talking about whole cameras and not fractional ones. You can also spot this conclusion by noticing that Poland's absolute disadvantage is relatively lower in televisions, because Poland needs twice as many workers to produce a television but three times as many to produce a video camera, so the product with the relatively lower absolute disadvantage is Poland's comparative advantage.

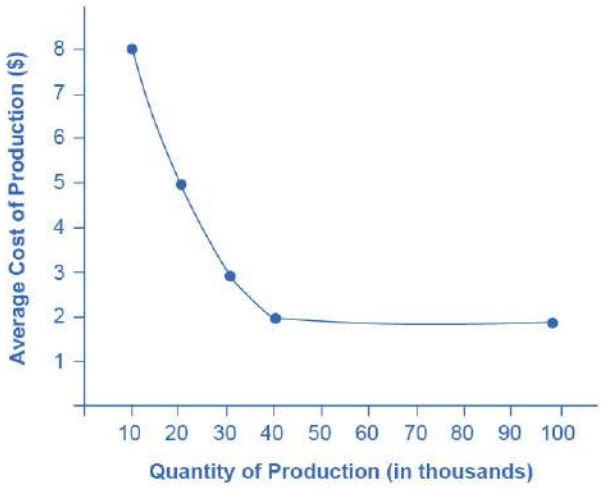
c. Producing a video camera in Germany requires four workers, and shifting those four workers away from television production has an opportunity cost of 4/3 television sets. Producing a video camera in Poland requires 12 workers, and shifting those 12 workers away from television production has an opportunity cost of two television sets. Thus, the opportunity cost of producing video cameras is lower in Germany, and video cameras will be Germany's comparative advantage.

d. In this example, absolute advantage differs from comparative advantage. Germany has the absolute advantage in the production of both goods, but Poland has a comparative advantage in the production of televisions.

e. Germany should specialize, at least to some extent, in the production of video cameras, export video cameras, and import televisions. Conversely, Poland should specialize, at least to some extent, in the production of televisions, export televisions, and import video cameras.

5. There are a number of possible advantages of intra-industry trade. Both nations can take advantage of extreme specialization and learning in certain kinds of cars with certain traits, like gas-efficient cars, luxury cars, sport-utility vehicles, higher- and lower-quality cars, and so on. Moreover, nations can take advantage of economies of scale, so that large companies will compete against each other across international borders, providing the benefits of competition and variety to customers. This same argument applies to trade between U.S. states, where people often buy products made by people of other states, even though a similar product is made within the boundaries of their own state. All states—and all countries—can benefit from this kind of competition and trade.

6. a. Start by plotting the points on a sketch diagram and then drawing a line through them. The following figure illustrates the average costs of production of semiconductors.



The curve illustrates economies of scale by showing that as the scale increases—that is, as production at this particular factory goes up—the average cost of production declines. The economies of scale exist up to an output of 40,000 semiconductors; at higher outputs, the average cost of production does not seem to decline any further.

b. At any quantity demanded above 40,000, this economy can take full advantage of economies of scale; that is, it can produce at the lowest cost per unit. Indeed, if the quantity demanded was quite high, like 500,000, then there could be a number of different factories all taking full advantage of economies of scale and competing with each other. If the quantity demanded falls below 40,000, then the economy by itself, without foreign trade, cannot take full advantage of economies of scale.

c. The simplest answer to this question is that the small country could have a large enough factory to take full advantage of economies of scale, but then export most of the output. For semiconductors, countries like Taiwan and Korea have recently fit this description. Moreover, this country could also

import semiconductors from other countries which also have large factories, thus getting the benefits of competition and variety. A slightly more complex answer is that the country can get these benefits of economies of scale without producing semiconductors, but simply by buying semiconductors made at low cost around the world. An economy, especially a smaller country, may well end up specializing and producing a few items on a large scale, but then trading those items for other items produced on a large scale, and thus gaining the benefits of economies of scale by trade, as well as by direct production.

7. A nation might restrict trade on imported products to protect an industry that is important for national security. For example, nation X and nation Y may be geopolitical rivals, each with ambitions of increased political and economic strength. Even if nation Y has comparative advantage in the production of missile defense systems, it is unlikely that nation Y would seek to export those goods to nation X. It is also the case that, for some nations, the production of a particular good is a key component of national identity. In Japan, the production of rice is culturally very important. It may be difficult for Japan to import rice from a nation like Vietnam, even if Vietnam has a comparative advantage in rice production.

Chapter 34

1. This is the opposite case of the Work It Out feature. A reduced tariff is like a decrease in the cost of production, which is shown by a downward (or rightward) shift in the supply curve.
2. A subsidy is like a reduction in cost. This shifts the supply curve down (or to the right), driving the price of sugar down. If the subsidy is large enough, the price of sugar can fall below the cost of production faced by foreign producers, which means they will lose money on any sugar they produce and sell.
3. Trade barriers raise the price of goods in protected industries. If those products are inputs in other industries, it raises their production costs and then prices, so sales fall in those other industries. Lower sales lead to lower employment. Additionally, if the protected industries are consumer goods, their customers pay higher prices, which reduce demand for other consumer products and thus employment in those industries.
4. Trade based on comparative advantage raises the average wage rate economy-wide, though it can reduce the incomes of import-substituting industries. By moving away from a country's comparative advantage, trade barriers do the opposite: they give workers in protected industries an advantage, while reducing the average wage economy-wide.
5. By raising incomes, trade tends to raise working conditions also, even though those conditions may not (yet) be equivalent to those in high-income countries.
6. They typically pay more than the next-best alternative. If a Nike firm did not pay workers at least as much as they would earn, for example, in a subsistence rural lifestyle, they many never come to work for Nike.
7. Since trade barriers raise prices, real incomes fall. The average worker would also earn less.
8. Workers working in other sectors and the protected sector see a decrease in their real wage.
9. If imports can be sold at extremely low prices, domestic firms would have to match those prices to be competitive. By definition, matching prices would imply selling under cost and, therefore, losing money. Firms cannot sustain losses forever. When they leave the industry, importers can "take over," raising prices to monopoly levels to cover their short-term losses and earn long-term profits.
10. Because low-income countries need to provide necessities—food, clothing, and shelter—to their people. In other words, they consider environmental quality a luxury.
11. Low-income countries can compete for jobs by reducing their environmental standards to attract business to their countries. This could lead to a competitive reduction in regulations, which would lead to greater environmental damage. While pollution management is a cost for businesses, it is tiny relative to other costs, like labor and adequate infrastructure. It is also costly for firms to locate far away from their customers, which many low-income countries are.
12. The decision should not be arbitrary or unnecessarily discriminatory. It should treat foreign companies the same way as domestic companies. It should be based on science.

13. Restricting imports today does not solve the problem. If anything, it makes it worse since it implies using up domestic sources of the products faster than if they are imported. Also, the national security argument can be used to support protection of nearly any product, not just things critical to our national security.

14. The effect of increasing standards may increase costs to the small exporting country. The supply curve of toys will shift to the left. Exports will decrease and toy prices will rise. Tariffs also raise prices. So the effect on the price of toys is the same. A tariff is a "second best" policy and also affects other sectors. However, a common standard across countries is a "first best" policy that attacks the problem at its root.

15. A free trade association offers free trade between its members, but each country can determine its own trade policy outside the association. A common market requires a common external trade policy in addition to free trade within the group. An economic union is a common market with coordinated fiscal and monetary policy.

16. International agreements can serve as a political counterweight to domestic special interests, thereby preventing stronger protectionist measures.

17. Reductions in tariffs, quotas, and other trade barriers, improved transportation, and communication media have made people more aware of what is available in the rest of the world.

18. Competition from firms with better or cheaper products can reduce a business's profits, and may drive it out of business. Workers would similarly lose income or even their jobs.

19. Consumers get better or less expensive products. Businesses with the better or cheaper products increase their profits. Employees of those businesses earn more income. On balance, the gains outweigh the losses to a nation.

REFERENCES

Welcome to Economics!

Bureau of Labor Statistics, U.S. Department of Labor. 2015. "The Employment Situation—February 2015." Accessed March 27, 2015. http://www.bls.gov/news.release/pdf/empsit.pdf.

Williamson, Lisa. "US Labor Market in 2012." *Bureau of Labor Statistics*. Accessed December 1, 2013. http://www.bls.gov/opub/mlr/2013/03/art1full.pdf.

The Heritage Foundation. 2015. "2015 Index of Economic Freedom." Accessed March 11, 2015. http://www.heritage.org/index/ranking.

Garling, Caleb. "S.F. plane crash: Reporting, emotions on social media," *The San Francisco Chronicle*. July 7, 2013. http://www.sfgate.com/news/article/S-F-plane-crash-Reporting-emotions-on-social-4651639.php.

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

Pew Research Center. 2015. "Social Networking Fact Sheet." Accessed March 11, 2015. http://www.pewinternet.org/fact-sheets/social-networking-fact-sheet/.

Royal Swedish Academy of Sciences. 2019. "Research to Help the World's Poor." https://www.nobelprize.org/uploads/2019/10/popular-economicsciencesprize2019.pdf.

The World Bank Group. 2015. "World Data Bank." Accessed March 30, 2014. http://databank.worldbank.org/data/.

Choice in a World of Scarcity

Bureau of Labor Statistics, U.S. Department of Labor. 2015. "Median Weekly Earnings by Educational Attainment in 2014." Accessed March 27, 2015. http://www.bls.gov/opub/ted/2015/median-weekly-earnings-by-education-gender-race-and-ethnicity-in-2014.htm.

Robbins, Lionel. *An Essay on the Nature and Significance of Economic Science*. London: Macmillan. 1932.

United States Department of Transportation. "Total Passengers on U.S Airlines and Foreign Airlines U.S. Flights Increased 1.3% in 2012 from 2011." Accessed October 2013. http://www.rita.dot.gov/bts/press_releases/bts016_13

Smith, Adam. "Of Restraints upon the Importation from Foreign Countries." In *The Wealth of Nations*. London: Methuen & Co., 1904, first pub 1776), I.V. 2.9.

Smith, Adam. "Of the Propriety of Action." In *The Theory of Moral Sentiments*. London: A. Millar, 1759, 1.

Demand and Supply

Costanza, Robert, and Lisa Wainger. "No Accounting For Nature: How Conventional Economics Distorts the Value of Things." *The Washington Post*. September 2, 1990.

European Commission: Agriculture and Rural Development. 2013. "Overview of the CAP Reform: 2014-2024." Accessed April 13, 205. http://ec.europa.eu/agriculture/cap-post-2013/.

Radford, R. A. "The Economic Organisation of a P.O.W. Camp." *Economica*. no. 48 (1945): 189-201. http://www.jstor.org/stable/2550133.

Landsburg, Steven E. *The Armchair Economist: Economics and Everyday Life*. New York: The Free Press. 2012. specifically Section IV: How Markets Work.

National Chicken Council. 2015. "Per Capita Consumption of Poultry and Livestock, 1965 to Estimated 2015, in Pounds." Accessed April 13, 2015. https://www.nationalchickencouncil.org/about-the-industry/statistics/per-capita-consumption-of-poultry-and-livestock-1965-to-estimated-2012-in-pounds/.

Wessel, David. "Saudi Arabia Fears $40-a-Barrel Oil, Too." *The Wall Street Journal*. May 27, 2004, p. 42. https://online.wsj.com/news/articles/SB108561000087822300.

Pew Research Center. "Pew Research: Center for the People & the Press." http://www.people-press.org/.

Labor and Financial Markets

American Community Survey. 2012. "School Enrollment and Work Status: 2011." Accessed April 13, 2015. http://www.census.gov/prod/2013pubs/acsbr11-14.pdf.

National Center for Educational Statistics. "Digest of Education Statistics." (2008 and 2010). Accessed December 11, 2013. nces.ed.gov.

CreditCards.com. 2013. http://www.creditcards.com/credit-card-news/credit-card-industry-facts-personal-debt-statistics-1276.php.

Williams, Walter E. 2017. "Mimimum Wage and Discrimination." Distributed by Creators Syndicate. Accessed 2022. https://www.lubbockonline.com/story/opinion/columns/2017/02/13/walter-williams-minimum-wage-and-discrimination/14874014007.

Elasticity

Abkowitz, A. "How Netflix got started: Netflix founder and CEO Reed Hastings tells Fortune how he got the idea for the DVD-by-mail service that now has more than eight million customers." *CNN Money*. Last Modified January 28, 2009. http://archive.fortune.com/2009/01/27/news/newsmakers/hastings_netflix.fortune/index.htm.

Associated Press (a). "Analyst: Coinstar gains from Netflix pricing moves." *Boston Globe Media Partners, LLC*. Accessed June 24, 2013. http://www.boston.com/business/articles/2011/10/12/analyst_coinstar_gains_from_netflix_pricing_moves/.

Associated Press (b). "Netflix loses 800,000 US subscribers in tough 3Q." *ABC Inc*. Accessed June 24, 2013. http://abclocal.go.com/wpvi/story?section=news/business&id=8403368

Baumgardner, James. 2014. "Presentation on Raising the Excise Tax on Cigarettes: Effects on Health and the Federal Budget." Congressional Budget Office. Accessed March 27, 2015. http://www.cbo.gov/sites/default/files/45214-ICA_Presentation.pdf.

Funding Universe. 2015. "Netflix, Inc. History." Accessed March 11, 2015. http://www.fundinguniverse.com/company-histories/netflix-inc-history/.

Laporte, Nicole. "A tale of two Netflix." *Fast Company* 177 (July 2013) 31-32. Accessed December 3 2013. http://www.fastcompany-digital.com/fastcompany/20130708?pg=33#pg33

Liedtke, Michael, The Associated Press. "Investors bash Netflix stock after slower growth forecast - fee hikes expected to take toll on subscribers most likely to shun costly bundled Net, DVD service." *The Seattle Times*. Accessed June 24, 2013 from NewsBank on-line database (Access World News).

Netflix, Inc. 2013. "A Quick Update On Our Streaming Plans And Prices." Netflix (blog). Accessed March 11, 2015. http://blog.netflix.com/2014/05/a-quick-update-on-our-streaming-plans.html.

Organization for Economic Co-Operation and Development (OECC). n.d. "Average annual hours actually

worked per worker." Accessed March 11, 2015. https://stats.oecd.org/Index.aspx?DataSetCode=ANHRS.

Savitz, Eric. "Netflix Warns DVD Subs Eroding; Q4 View Weak; Losses Ahead; Shrs Plunge." *Forbes.com*, 2011. Accessed December 3, 2013. http://www.forbes.com/sites/ericsavitz/2011/10/24/netflix-q3-top-ests-but-shares-hit-by-weak-q4-outlook/.

Statistica.com. 2014. "Coffee Export Volumes Worldwide in November 2014, by Leading Countries (in 60-kilo sacks)." Accessed March 27, 2015. http://www.statista.com/statistics/268135/ranking-of-coffee-exporting-countries/.

Stone, Marcie. "Netflix responds to customers angry with price hike; Netflix stock falls 9%." *News & Politics Examiner*, 2011. Clarity Digital Group. Accessed June 24, 2013. http://www.examiner.com/article/netflix-responds-to-customers-angry-with-price-hike-netflix-stock-falls-9.

Weinman, J. (2012). Die hard, hardly dying. Maclean's, 125(18), 44.

The World Bank Group. 2015. "Gross Savings (% of GDP)." Accessed March 11, 2015. http://data.worldbank.org/indicator/NY.GNS.ICTR.ZS.

Yahoo Finance. Retrieved from http://finance.yahoo.com/q?s=NFLX

Consumer Choices

U.S. Bureau of Labor Statistics. 2015. "Consumer Expenditures in 2013." Accessed March 11, 2015. http://www.bls.gov/cex/csxann13.pdf.

U.S. Bureau of Labor Statistics. 2015. "Employer Costs for Employee Compensation—December 2014." Accessed March 11, 2015. http://www.bls.gov/news.release/pdf/ecec.pdf.

U.S. Bureau of Labor Statistics. 2015. "Labor Force Statistics from the Current Population Survey." Accessed March 11, 2015. http://www.bls.gov/cps/cpsaat22.htm.

Holden, Sarah, and Daniel Schrass. 2012. "The rose of IRAs in U.S Households' Saving for Retirement, 2012." *ICI Research Perspective* 18.8 (2012). http://www.ici.org/pdf/per18-08.pdf.

Kahneman, Daniel and Amos Tversky. "Prospect Theory: An Analysis of Decision under Risk." *Econometrica* 47.2 (March 1979) 263-291.

Thaler, Richard H. "Shifting Our Retirement Savings into Automatic." *The New York Times*, April 6, 2013. http://www.nytimes.com/2013/04/07/business/an-automatic-solution-for-the-retirement-savings-problem.html?pagewanted=all.

UNESCO Institute for Statistics. "Statistics in Brief / Profiles" Accessed August 2013. http://stats.uis.unesco.org/unesco/TableViewer/document.aspx?ReportId=121 &IF_Language=en&BR_Country=5580.

Production, Costs, and Industry Structure

2010 U.S. Census. www.census.gov.

Perfect Competition

Index Mundi. n.d. "Wheat Monthly Price—U.S. Dollars per Metric Ton." Accessed March 11, 2015. http://www.indexmundi.com/commodities/?commodity=wheat.

Knutson, J. "Wheat on the Defensive in the Northern Plains." *Agweek, Associated Press State Wire: North Dakota (ND)*. April 14, 2013.

SBA Office of Advocacy. 2014. "Frequently Asked Questions: Advocacy: the voice of small business in government." Accessed March 11, 2015. https://www.sba.gov/sites/default/files/advocacy/FAQ_March_2014_0.pdf.

Monopoly

Aboukhadijeh, Feross. “Chapter 20: Girding for War - The North and the South, 1861-1865.” *StudyNotes, Inc.* Accessed July 7, 2013. http://www.apstudynotes.org/us-history/outlines/chapter-20-girding-for-war-the-north-and-the-south-1861-1865/.

British Parliament. “(28 August 1833). Slavery Abolition Act 1833; Section LXIV.” Accessed July 2013. http://www.pdavis.nl/Legis_07.htm.

Dattel, E. (nd). "Cotton and the Civil War." *Mississippi Historical Society*. Accessed July 2013. http://mshistorynow.mdah.state.ms.us/articles/291/cotton-and-the-civil-war.

Gartner. 2015. “Gartner Says Tablet Sales Continue to Be Slow in 2015.” Accessed March 12, 2015. http://www.gartner.com/newsroom/id/2954317.

Grogan, David. 2015. “Federal Judge Finds AmEx’s Anti-Steering Rule Violates Antitrust Law.” American Booksellers Association. Accessed March 12, 2015. http://www.bookweb.org/news/federal-judge-finds-amex%E2%80%99s-anti-steering-rule-violates-antitrust-law.

Massachusetts Historical Society. “The Coming of the American Revolution 1764-1776: The Boston Tea Party.” Retrieved from http://www.masshist.org/revolution/teaparty.php.

Massachusetts Historical Society. “Whereas our Nation.” *The Massachusetts Gazette*, p. 2. Accessed July 2013 http://www.masshist.org/revolution/image-viewer.php?old=1&item_id=457&img_step=1&nmask=1&mode=large.

Pelegrin, William. 2015. “Judge Overrules Antitrust Case Against Google , Says Setting Default Search Engines Is Fair.” Digital Trends. Accessed March 12, 2015. http://www.digitaltrends.com/mobile/judge-tosses-out-google-antitrust-lawsuit/.

Monopolistic Competition and Oligopoly

Kantar Media. “Our Insights: Infographic—U.S. Advertising Year End Trends Report 2012.” Accessed October 17, 2013. http://kantarmedia.us/insight-center/reports/infographic-us-advertising-year-end-trends-report-2012.

Statistica.com. 2015. “Number of Restaurants in the United States from 2011 to 2014.” Accessed March 27, 2015. http://www.statista.com/statistics/244616/number-of-qsr-fsr-chain-independent-restaurants-in-the-us/.

The United States Department of Justice. “Antitrust Division.” Accessed October 17, 2013. http://www.justice.gov/atr/.

eMarketer.com. 2014. “Total US Ad Spending to See Largest Increase Since 2004: Mobile advertising leads growth; will surpass radio, magazines and newspapers this year. Accessed March 12, 2015. http://www.emarketer.com/Article/Total-US-Ad-Spending-See-Largest-Increase-Since-2004/1010982.

Federal Trade Commission. “About the Federal Trade Commission.” Accessed October 17, 2013. http://www.ftc.gov/ftc/about.shtm.

Monopoly and Antitrust Policy

Bishop, Todd. 2014. “Microsoft Exec Admits New Reality: Market Share No Longer 90% — It’s 14%.”GeekWire. Accessed March 27, 2015. http://www.geekwire.com/2014/microsoft-exec-admits-new-reality-market-share-longer-90-14/.

Catan, T., & Dezember, R. “Kinder-El Paso Merger to Face Antitrust Scrutiny,” *Wall Street Journal*. October 19, 2011.

Collins, A. "Tallgrass Energy to Acquire Kinder Morgan Assets for $1.8B." *The Middle Market*, Accessed August 2013. http://www.themiddlemarket.com/news/tallgrass-energy-to-acquire-kinder-morgan-assets-for-1-point-8-billion-232862-1.html.

Conoco Phillips. "Why Natural Gas." Accessed August 2013. http://www.powerincooperation.com/en/pages/useful.html?gclid=COXg7rH3hrgCFWlp7AodtkgA3g.

De la Merced, M. (2012, August 20). "Kinder Morgan to Sell Assets to Tallgrass for $1.8 Billion." *The New York Times*. August 20, 2012.

The Federal Trade Commission. n.d. "The Federal Trade Commission's (FTC) Mission." Accessed March 27, 2015. https://www.ftc.gov/system/files/documents/reports/2014-one-page-ftc-performance-snapshot/150218fy14snapshot.pdf.

Kahn, C. "Kinder Morgan to Buy El Paso Corp. for $20.7B." *USA Today*. October 17, 2011.

Kinder Morgan. (2013). "Investor Information." Accessed August 2013. http://www.kindermorgan.com/investor/.

Rogowsky, Mark. 2014. "There'd Be No Wireless Wars Without The Blocked T-Mobile Merger, So Where Does That Leave Comcast-TWC?" Forbes.com. Accessed March 12, 2015. http://www.forbes.com/sites/markrogowsky/2014/08/27/t-mobile-and-sprint-continue-to-battle-thanks-to-the-government/.

U.S. Energy Information Administration (a). "Natural Gas Consumption by End User." Accessed May 31, 2013. http://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm.

U.S. Energy Information Administration (b). "Natural Gas Prices." Accessed June 28, 2013. http://www.eia.gov/dnav/ng/ng_pri_sum_dcu_nus_a.htm.

The Wall Street Journal. 2015. "Auto Sales." Accessed April 10, 2015. http://online.wsj.com/mdc/public/page/2_3022-autosales.html.

Environmental Protection and Negative Externalities

Johnson, Oscar William. "Back on Track: Earth Day Success Story; The Chattanooga Choo-Choo No Longer Spews Foul Air." *Sports Illustrated*. April 30, 1990. http://www.si.com/vault/1990/04/30/121923/back-on-track-earth-day-success-story-the-chattanooga-choo-choo-no-longer-spews-foul-air.

U.S. Energy Information Administration. "Total Energy: Monthly Energy Review." *U.S. Department of Energy*. Accessed December 19, 2013. http://www.eia.gov/totalenergy/data/monthly/.

Environmental Protection Agency. "2006 Pay-As-You-Throw Programs." Accessed December 20, 2013. http://www.epa.gov/epawaste/conserve/tools/payt/states/06comm.htm.

European Union. "Durban Conference Delivers Breakthrough for Climate." Press release. December 11, 2012. Accessed December 19, 2013. http://europa.eu/rapid/press-release_MEMO-11-895_en.htm?locale=en.

Positive Externalities and Public Goods

Arias, Omar and Walter W. McMahon. "Dynamic Rates of Return to Education in the U.S." *Economics of Education Review*. 20, 2001. 121–138.

Biography.com. 2015. "Alan Turing." Accessed April 1, 2015. http://www.biography.com/people/alan-turing-9512017.

Canty Media. 2015. "The World: Life Expectancy (2015) - Top 100+." Accessed April 1, 2015. http://www.geoba.se/population.php?pc=world&type=15.

Hyclak, Thomas, Geraint Johnes, and Robert Thornton. *Fundamentals of Labor Economics.* Boston: Houghton Mifflin Company, 2005.

McMahon, Walter. *Education and Development: Measuring the Social Benefits.* Oxford: Oxford University Press, 2000.

McTigue, Kathleen. 2019. "Economic Benefits of the Global Position System to the Private Sector." *National Institute of Standards and Technology*. https://www.nist.gov/news-events/news/2019/10/economic-benefits-global-positioning-system-us-private-sector-study.

Mazzucato, Mariana and Carlota Perez. 2014. "Innovation as Growth Policy: The Challenge for Europe." *Science Policy Research Unit*. https://www.sussex.ac.uk/webteam/gateway/file.php?name=2014-13-swps-mazzucato-perez.pdf&site=25.

Mazzucato, Mariana. *The Entreprenurial State: Debunking Public vs. Private Sector Myths*. Public Affairs, 2015.

National Institute of Health. 2015. "Global Competitiveness—The Importance of U.S. Leadership in Science and Innovation for the Future of Our Economy and Our Health." Accessed April 1, 2015. http://www.nih.gov/about/impact/impact_global.pdf.

National Science Foundation. 2013. "U.S. R&D Spending Resumes Growth in 2010 and 2011 but Still Lags Behind the Pace of Expansion of the National Economy." Accessed April 1, 2015. http://www.nsf.gov/statistics/infbrief/nsf13313/.

Ostrom, Elinor. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambrige University Press, 1990.

Perez, Carlota. 2009. "Long Run Economic Transformation: After the Crisis." OME Annual Report 2009–2010.

Psacharopoulos, George. "Returns to Investment in Education: A Global Update." *World Development* 22, 1994. 1325–1343.

Salientes-Narisma, Corrie. "Samsung Shift to Innovative Devices Pay Off." *Inquirer Technology*. Accessed May 15, 2013. http://technology.inquirer.net/23831/samsungs-shift-to-innovative-devices-pays-off.

United States Department of the Treasury. "Research and Experimentation Tax Credit." Accessed November 2013. http://www.treasury.gov/press-center/news/Pages/investing-in-us-competitiveness.aspx.

U.S. Patent and Trademark Office. 2015. "U.S. Patent Statistics: Calendar Years 1963–2014." Accessed April 10, 2015. http://www.uspto.gov/web/offices/ac/ido/oeip/taf/us_stat.pdf.

United for Medical Research. "Profiles of Prosperity: How NIH-Supported Research Is Fueling Private Sector Growth and Innovation." Introduction. Accessed January 2014. http://www.unitedformedicalresearch.com/wp-content/uploads/2013/07/UMR_ProsperityReport_071913a.pdf.

Cowen, Tyler. *Average Is Over: Powering America Beyond the Age of the Great Stagnation*. Dutton Adult, 2013.

Hardin, Garret. "The Tragedy of the Commons." *Science* 162 (3859): 1243–48 (1968).

Labor Markets and Income

AFL-CIO. "Training and Apprenticeships." http://www.aflcio.org/Learn-About-Unions/Training-and-Apprenticeships.

Cook, Lisa D. 2020. "Policies To Broaden Participation in the Innovation Process." *The Hamilton Project*. https://www.hamiltonproject.org/assets/files/Cook_PP_LO_8.13.pdf.

Darity Jr., William A. 1998. "Evidence of Discrimination in Employment: Codes of Color, Codes of Gender." *Journal of Economic Perspectives* 12 (2): 63–90.

Central Intelligence Agency. "The World Factbook." https://www.cia.gov/library/publications/the-world-factbook/index.html.

Clark, John Bates. *Essentials of Economic Theory: As Applied to Modern Problems of Industry and Public Policy*. New York: A. M. Kelley, 1907, 501.

United Auto Workers (UAW). "About: Who We Are." http://www.uaw.org/page/who-we-are.

United States Department of Labor: Bureau of Labor Statistics. "Economic News Release: Union Members Summary." Last modified January 23, 2013. http://www.bls.gov/news.release/union2.nr0.htm.

United States Department of Labor, Bureau of Labor Statistics. 2015. "Economic News; Union Members Summary." Accessed April 13, 2015. http://www.bls.gov/news.release/union2.nr0.htm.

Clune, Michael S. "The Fiscal Impacts of Immigrants: A California Case Study." In *The Immigration Debate: Studies on the Economic, Demographic, and Fiscal Effects of Immigration*, edited by James P. Smith and Barry Edmonston. Washington, DC: National Academy Press, 1998, 120–182. http://www.nap.edu/openbook.php?record_id=5985&page=120.

Smith, James P. "Immigration Reform." *Rand Corporation: Rand Review*. http://www.rand.org/pubs/periodicals/rand-review/issues/2012/fall/leadership/immigration-reform.html.

U.S. Department of Homeland Security: Office of Immigration Statistics. "2011 Yearbook of Immigration Statistics." September 2012. http://www.dhs.gov/sites/default/files/publications/immigration-statistics/yearbook/2011/ois_yb_2011.pdf.

Anderson, Deborah J., Melissa Binder, and Kate Krause. "The Motherhood Wage Penalty Revisited: Experience, Heterogeneity, Work Effort, and Work-Schedule Flexibility." *Industrial and Labor Relations Review*. no. 2 (2003): 273–294. http://www2.econ.iastate.edu/classes/econ321/orazem/anderson_motherhood-penalty.pdf.

Turner, Margery Austin, Rob Santos, Diane K. Levy, Doug Wissoker, Claudia Aranda, Rob Pitingolo, and The Urban Institute. "Housing Discrimination Against Racial and Ethnic Minorities 2012." *U.S. Department of Housing and Urban Development*. Last modified June 2013. http://www.huduser.org/Publications/pdf/HUD-514_HDS2012.pdf.

Austin, Algernon. "The Unfinished March: An Overview." *Economic Policy Institute*. Last modified June 18, 2013. http://www.epi.org/publication/unfinished-march-overview/.

Bertrand, Marianne, and Sendhil Mullainathan. "Are Emily and Greg More Employable Than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination." *American Economic Review*. no. 4 (2004): 991-1013. https://www.aeaweb.org/articles.php?doi=10.1257/0002828042002561&fnd=s.

Blau, Francine D., and Laurence M. Kahn. "The Gender Pay Gap: Have Women Gone as Far as They Can?" *Academy of Management Perspectives*. no. 1 (2007): 7–23. 10.5465/AMP.2007.24286161.

Card, David, and Alan B. Kruger. "Trends in Relative Black–White Earnings Revisited (Working Paper #310)." *Princeton University and the National Bureau of Economic Research*. December 1992. http://harris.princeton.edu/pubs/pdfs/310.pdf.

Donovan, Theresa. Jurist. "Federal Judge Rejects Class Status in Wal-Mart Discrimination Suit." Last modified August 5, 2013. http://jurist.org/paperchase/2013/08/federal-judge-rejects-class-status-in-wal-mart-discrimination-suit.php.

Harris, Elizabeth A. "Labor Panel Finds Illegal Punishments at Walmart." *The New York Times*, November 18, 2013. http://www.nytimes.com/2013/11/19/business/labor-panel-finds-illegal-punishments-at-walmart.html?_r=1&.

Kolesnikova, Natalia A., and Yang Liu. Federal Reserve Bank of St. Louis: The Regional Economist. "Gender Wage Gap May Be Much Smaller Than Most Think." Last modified October 2011. http://www.stlouisfed.org/publications/re/articles/?id=2160.

Podmolik, Mary Ellen. "HUD Finds Housing Discrimination 'Hidden' But Prevalent." *Chicago Tribune: Business*, June 12, 2013. http://articles.chicagotribune.com/2013-06-12/business/ct-biz-0612-housing-discrimination-20130612_1_renters-testers-chicago-area.

Spreen, Thomas Luke. United States Department of Labor: Bureau of Labor Statistics. "Recent College Graduates in the U.S. Labor Force: Data from the Current Population Survey." *Monthly Labor Review* (February, 2013). http://www.bls.gov/opub/mlr/2013/02/art1full.pdf .

U.S. Bureau of Labor Statistics: BLS Reports. 2014. "Women in the Labor Force: A Databook (Report 1052)." Accessed April 13, 2015. http://www.bls.gov/opub/reports/cps/women-in-the-labor-force-a-databook-2014.pdf.

U.S. Equal Employment Opportunity Commission, "Walmart to Pay More than $11.7 Million to Settle EEOC Sex Discrimination Suit." Last modified March 1, 2010. http://www.eeoc.gov/eeoc/newsroom/release/3-1-10.cfm.

United States Census Bureau. 2014. "Table 1. Educational Attainment of the Population 18 Years and Over, by Age, Sex, Race, and Hispanic Origin: 2014." Accessed April 13, 2015. http://www.census.gov/hhes/socdemo/education/data/cps/2014/tables.html.

United States Department of Labor: Bureau of Labor Statistics. "News Release: Usual Weekly Earnings of Wage and Salary Workers (Third Quarter 2013)." November 1, 2013. http://www.bls.gov/news.release/pdf/wkyeng.pdf.

Warner, Judith. 2014. "Fact Sheet: The Women's Leadership Gap: Women's Leadership by the Numbers." Center for American Progress. Accessed March 16, 2015. https://www.americanprogress.org/issues/women/report/2014/03/07/85457/fact-sheet-the-womens-leadership-gap/.

Weinberger, Catherine J., and Lois Joy. "The Relative Earnings of Black College Graduates, 1980–2001." In *Race and Economic Opportunity in the 21st Century*, edited by Marlene Kim. New York: Routledge, 2007. http://www.econ.ucsb.edu/~weinberg/grads.pdf.

Poverty and Economic Inequality

Ebeling, Ashlea. 2014. "IRS Announces 2015 Estate And Gift Tax Limits." Forbes. Accessed March 16, 2015. http://www.forbes.com/sites/ashleaebeling/2014/10/30/irs-announces-2015-estate-and-gift-tax-limits/.

Federal Register: The Daily Journal of the United States Government. "State Median Income Estimates for a Four-Person Household: Notice of the Federal Fiscal Year (FFY) 2013 State Median Income Estimates for Use Under the Low Income Home Energy Assistance Program (LIHEAP)." Last modified March 15, 2012. https://www.federalregister.gov/articles/2012/03/15/2012-6220/state-median-income-estimates-for-a-four-person-household-notice-of-the-federal-fiscal-year-ffy-2013#t-1.

Luhby, Tami. 2014. "Income is on the rise . . . finally!" Accessed April 10, 2015. http://money.cnn.com/2014/08/20/news/economy/median-income/.

Meyer, Ali. 2015. "56,023,000: Record Number of Women Not in Labor Force." CNSNews.com. Accessed March 16, 2015. http://cnsnews.com/news/article/ali-meyer/56023000-record-number-women-not-labor-force.

Orshansky, Mollie. "Children of the Poor." *Social Security Bulletin*. 26 no. 7 (1963): 3–13. http://www.ssa.gov/policy/docs/ssb/v26n7/v26n7p3.pdf.

The World Bank. "Data: Poverty Headcount Ratio at $1.25 a Day (PPP) (% of Population)." http://data.worldbank.org/indicator/SI.POV.DDAY.

U.S. Department of Commerce: United States Census Bureau. "American FactFinder." http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml.

U.S. Department of Commerce: United States Census Bureau. “Current Population Survey (CPS): CPS Table Creator.” http://www.census.gov/cps/data/cpstablecreator.html.

U.S. Department of Commerce: United States Census Bureau. “Income: Table F-6. Regions—Families (All Races) by Median and Mean Income.” http://www.census.gov/hhes/www/income/data/historical/families/.

U.S. Department of Commerce: United States Census Bureau. “Poverty: Poverty Thresholds.” Last modified 2012. http://www.census.gov/hhes/www/poverty/data/threshld/.

U.S. Department of Health & Human Services. 2015. “2015 Poverty Guidelines.” Accessed April 10, 2015. http://www.medicaid.gov/medicaid-chip-program-information/by-topics/eligibility/downloads/2015-federal-poverty-level-charts.pdf.

U.S. Department of Health & Human Services. 2015. “Information on Poverty and Income Statistics: A Summary of 2014 Current Population Survey Data.” Accessed April 13, 2015. http://aspe.hhs.gov/hsp/14/povertyandincomeest/ib_poverty2014.pdf.

Congressional Budget Office. 2015. “The Effects of Potential Cuts in SNAP Spending on Households With Different Amounts of Income.” Accessed April 13, 2015. https://www.cbo.gov/publication/49978.

Falk, Gene. Congressional Research Service. “The Temporary Assistance for Needy Families (TANF) Block Grant: Responses to Frequently Asked Questions.” Last modified October 17, 2013. http://www.fas.org/sgp/crs/misc/RL32760.pdf.

Library of Congress. “Congressional Research Service.” http://www.loc.gov/crsinfo/about/.

Office of Management and Budget. “Fiscal Year 2013 Historical Tables: Budget of the U.S. Government.” http://www.whitehouse.gov/sites/default/files/omb/budget/fy2013/assets/hist.pdf.

Tax Policy Center: Urban Institute and Brookings Institution. “The Tax Policy Briefing Book: Taxation and the Family: What is the Earned Income Tax Credit?” http://www.taxpolicycenter.org/briefing-book/key-elements/family/eitc.cfm.

Frank, Robert H., and Philip J. Cook. *The Winner-Take-All Society*. New York: Martin Kessler Books at The Free Press, 1995.

Institute of Education Sciences: National Center for Education Statistics. “Fast Facts: Degrees Conferred by Sex and Race.” http://nces.ed.gov/fastfacts/display.asp?id=72.

Nhan, Doris. “Census: More in U.S. Report Nontraditional Households.” *National Journal*. Last modified May 1, 2012. http://www.nationaljournal.com/thenextamerica/demographics/census-more-in-u-s-report-nontraditional-households-20120430.

U.S. Bureau of Labor Statistics: BLS Reports. “Report 1040: Women in the Labor Force: A Databook.” Last modified March 26, 2013. http://www.bls.gov/cps/wlf-databook-2012.pdf.

U.S. Department of Commerce: United States Census Bureau. “Income: Table H-2. Share of Aggregate Income Received by Each Fifth and Top 5 Percent of Households.” http://www.census.gov/hhes/www/income/data/historical/household/.

United States Census Bureau. 2014. “2013 Highlights.” Accessed April 13, 2015. http://www.census.gov/hhes/www/poverty/about/overview/.

United States Census Bureau. 2014. “Historical Income Tables: Households: Table H-2 Share of Aggregate Income Received by Each Fifth and Top 5% of Income. All Races.” Accessed April 13, 2015. http://www.census.gov/hhes/www/income/data/historical/household/.

Board of Governors of the Federal Reserve System. “Research Resources: Survey of Consumer Finances.” Last modified December 13, 2013. http://www.federalreserve.gov/econresdata/scf/scfindex.htm.

Congressional Budget Office. "The Distribution of Household Income and Federal Taxes, 2008 and 2009." Last modified July 10, 2012. http://www.cbo.gov/publication/43373.

Huang, Chye-Ching, and Nathaniel Frentz. "Myths and Realities About the Estate Tax." *Center on Budget and Policy Priorities*. Last modified August 29, 2013. http://www.cbpp.org/files/estatetaxmyths.pdf.

Information, Risk, and Insurance

Center on Budget and Policy Priorities. 2015. "Policy Basics: Where Do Our Federal Tax Dollars Go?" Accessed April 1, 2015. http://www.cbpp.org/cms/?fa=view&id=1258.

Consumer Reports. "Consumer Reports.org." http://www.consumerreports.org/cro/index.htm.

Federal Trade Commission. "About the Federal Trade Commission." Last modified October 17, 2013. http://www.ftc.gov/ftc/about.shtm.

Huffington Post. 2015. "HUFFPOLLSTER: Poll Shows Uptick In Obamacare Favorable Rating." Accessed April 1, 2015. http://www.huffingtonpost.com/2015/03/19/affordable-care-act-fav_n_6900938.html.

Kahneman, Daniel, and Amos Tversky. "Prospect Theory: An Analysis of Decision under Risk." *Econometrica*. 47, no. 2 (1979): 263-291. http://www.princeton.edu/~kahneman/docs/Publications/prospect_theory.pdf.

Rasmussen Reports, LLC. "Rasmussen Reports." http://www.rasmussenreports.com/.

Central Intelligence Agency. "The World Factbook." https://www.cia.gov/library/publications/the-world-factbook/index.html.

National Association of Insurance Commissioners. "National Association of Insurance Commissioners & The Center for Insurance Policy and Research." http://www.naic.org/.

OECD. "The Organisation for Economic Co-operation and Development (OECD)." http://www.oecd.org/about/.

USA Today. 2015. "Uninsured Rates Drop Dramatically under Obamacare." Accessed April 1, 2015. http://www.usatoday.com/story/news/nation/2015/03/16/uninsured-rates-drop-sharply-under-obamacare/24852325/.

Thaler, Richard H., and Sendhil Mullainathan. "The Concise Encyclopedia of Economics: Behavioral Economics." *Library of Economics and Liberty*. http://www.econlib.org/library/Enc/BehavioralEconomics.html.

Henry J. Kaiser Family Foundation, The. "Health Reform: Summary of the Affordable care Act." Last modified April 25, 2013. http://kff.org/health-reform/fact-sheet/summary-of-new-health-reform-law/.

Financial Markets

National Venture Capital Association. "Recent Stats & Studies." http://www.nvca.org/index.php?option=com_content&view=article&id=344&Itemid=103Update.

Freddie Mac. 2015. "Freddie Mac Update: March 2015." Accessed April 13, 2015. http://www.freddiemac.com/investors/pdffiles/investor-presentation.pdf.

Former, Jamie D. "Should Your Small Business Go Public? Consider the Benefits and Risks of Becoming a Publicly Traded Company." *U.S. Small Business Administration: Community Blog (blog)*. Publication date March 23, 2010. http://www.sba.gov/community/blogs/community-blogs/business-law-advisor/should-your-small-business-go-public-consider-0.

Howley, Kathleen M. Bloomberg. "Home Value Highest Since '07 as U.S. Houses Make Cash." Last modified March 26, 2013. http://www.bloomberg.com/news/2013-03-26/home-value-highest-since-07-as-u-s-houses-make-cash-mortgages.html.

NASDAQ.com. 2015. “Facebook, Inc. Historical Stock Prices.” Accessed March 28, 2015. http://www.nasdaq.com/symbol/fb/historical.

National Association of Realtors. 2015. “Existing-Home Sales: Latest News.” Accessed April 1, 2015. http://www.realtor.org/topics/existing-home-sales/data.

PricewaterhouseCoopers LLP. 2015. “Annual Venture Capital Investment Tops $48 Billion in 2014, Reaching Hightest Level in Over a Decade, According to the Moneytree Report.” Accessed April 1, 2015. http://www.pwc.com/us/en/press-releases/2015/annual-venture-capital-investment-tops-48-billion.jhtml.

Rooney, Ben. “Trading Program Sparked May ‘Flash Crash’.” *CNN Money*. Last modified October 1, 2010. http://money.cnn.com/2010/10/01/markets/SEC_CFTC_flash_crash/index.htm.

Investment Company Institute. “2013 Investment Company Fact Book, Chapter 6: Characteristics of Mutual Fund Owners.” http://icifactbook.org/fb_ch6.html.

U.S. Department of Commerce: United States Census Bureau. “Income: Table H-13. Educational Attainment of Householder—Households with Householder 25 Years Old and Over by Median and Mean Income.” http://www.census.gov/hhes/www/income/data/historical/household/.

United States Department of Labor. Bureau of Labor Statistics. 2015. “Table 9. Quartiles and Selected Deciles of Usual Weekly Earnings of Full-Time Wage and Salary Workers by Selected Characteristics, 2014 Annual Averages.” Accessed April 1, 2015. http://www.bls.gov/news.release/wkyeng.t09.htm.

Public Economy

Olson, Mancur. *The Logic of Collective Action: Public Goods and the Theory of Groups*, (Boston: Harvard University Press, 1965).

Downs, Anthony. *An Economic Theory of Democracy*. New York: Harper, 1957.

Skinner, B.F. *Walden Two*. Indianapolis: Hackett Publishing Company, Inc., 1948.

American Civil Liberties Union (ACLU). "Voting Rights." https://www.aclu.org/voting-rights.

The New York Times. “The 2012 Money Race: Compare the Candidates.” http://elections.nytimes.com/2012/campaign-finance.

The Washington Post. “Exit Polls 2012: Where Americans Stood this Election.” Last modified November 7, 2012. http://www.washingtonpost.com/wp-srv/special/politics/2012-exit-polls/national-breakdown/.

Cornell University Law School: Legal Information Institute. “Citizens United v. Federal Election Committee (No. 08-205).” Last modified January 21, 2010. http://www.law.cornell.edu/supct/html/08-205.ZS.html.

U.S. Department of Commerce: United States Census Bureau. “Voting and Registration: Historical Time Series Tables; Table A-9: Reported Voting Rates in Presidential Election Years, by Selected Characteristics: November 1964 to 2012.” http://www.census.gov/hhes/www/socdemo/voting/publications/historical/index.html

Roper Center Public Opinion Archives. “A Brief History of Public Opinion on the Government’s Role in Providing Health Care.” Last modified September 23, 2013.

U.S. Department of Commerce: United States Census Bureau. “Voting and Registration: Historical Time Series Tables; Table A-10: Reported Registration Rates in Presidential Election Years, by Selected Characteristics: November 1968 to 2012.” http://www.census.gov/hhes/www/socdemo/voting/publications/historical/index.html

Nixon, Ron. “American Candy Makers. Pinched by Inflated Sugar Prices. Look Abroad.” *The New York Times*. Last modified October 30, 2013. http://www.nytimes.com/2013/10/31/us/american-candy-makers-

pinched-by-inflated-sugar-prices-look-abroad.html?_r=0.

Hufbauer, Gary Clyde, and Sean Lowry. "U.S. Tire Tariffs: Saving Few Jobs at High Cost (Policy Brief 12-9)." *Peterson Institute for International Economics*. Last modified April 2012.

The Macroeconomic Perspective

U.S. Department of Commerce: Bureau of Economic Analysis. "National data: National Income and Product Accounts Tables." http://bea.gov/iTable/iTable.cfm?ReqID=9&step=1.

U.S. Department of Commerce: United States Census Bureau. "Census of Governments: 2012 Census of Governments." http://www.census.gov/govs/cog/.

United States Department of Transportation. "About DOT." Last modified March 2, 2012. http://www.dot.gov/about.

U.S. Department of Energy. "Energy.gov." http://energy.gov/.

U.S. Department of Health & Human Services. "Agency for Healthcare Research and Quality." http://www.ahrq.gov/.

United States Department of Agriculture. "USDA." http://www.usda.gov/wps/portal/usda/usdahome.

Schneider, Friedrich. Department of Economics. "Size and Development of the Shadow Economy of 31 European and 5 other OECD Countries from 2003 to 2013: A Further Decline." *Johannes Kepler University*. Last modified April 5, 2013. http://www.econ.jku.at/members/Schneider/files/publications/2013/ShadEcEurope31_Jan2013.pdf.

The National Bureau of Economic Research. "Information on Recessions and Recoveries, the NBER Business Cycle Dating Committee, and related topics." http://www.nber.org/cycles/main.html.

Economic Growth

Bolt, Jutta, and Jan Luiten van Zanden. "The Maddison Project: The First Update of the Maddison Project Re-Estimating Growth Before 1820 (Maddison-Project Working Paper WP-4)." *University of Groningen: Groningen Growth and Development Centre*. Last modified January 2013. http://www.ggdc.net/maddison/publications/pdf/wp4.pdf.

Central Intelligence Agency. "The World Factbook: Country Comparison GDP (Purchasing Power Parity)." https://www.cia.gov/library/publications/the-world-factbook/rankorder/2001rank.html.

DeLong, Brad. "Lighting the Rocket of Growth and Lightening the Toil of Work: Another Outtake from My 'Slouching Towards Utopia' MS…." *This is Brad DeLong's Grasping Reality* (blog). September 3, 2013. http://delong.typepad.com/sdj/2013/09/lighting-the-rocket-of-growth-and-lightening-the-toil-of-work-another-outtake-from-my-slouching-towards-utopia-ms.html.

Easterlin, Richard A. "The Worldwide Standard of Living since 1800." *The Journal of Economic Perspectives*. no. 1 (2000): 7–26. http://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.14.1.7.

Maddison, Angus. *Contours of the World Economy 1-2030 AD: Essays in Macro-Economic History*. Oxford: Oxford University Press, 2007.

British Library. "Treasures in Full: Magna Carta." http://www.bl.uk/treasures/magnacarta/.

Rothbard, Murray N. Ludwig von Mises Institute. "Property Rights and the Theory of Contracts." *The Ethics of Liberty*. Last modified June 22, 2007. http://mises.org/daily/2580.

Salois, Matthew J., J. Richard Tiffin, and Kelvin George Balcombe. IDEAS: Research Division of the Federal Reserve Bank of St. Louis. "Impact of Income on Calorie and Nutrient Intakes: A Cross-Country Analysis." Presention at the annual meeting of the Agricultural and Applied Economics Association, Pittsburg, PA, July

24–26, 2011. http://ideas.repec.org/p/ags/aaea11/103647.html.

van Zanden, Jan Luiten. *The Long Road to the Industrial Revolution: The European Economy in a Global Perspective, 1000–1800 (Global Economic History Series)*. Boston: Brill, 2009.

The World Bank. "CPIA Property Rights and Rule-based Governance Rating (1=low to 6=high)." http://data.worldbank.org/indicator/IQ.CPA.PROP.XQ.

Rex A. Hudson, ed. *Brazil: A Country Study*. "Spectacular Growth, 1968–73." Washington: GPO for the Library of Congress, 1997. http://countrystudies.us/brazil/64.htm.

"Women and the World Economy: A Guide to Womenomics." *The Economist*, April 12, 2006. http://www.economist.com/node/6802551.

Farole, Thomas, and Gokhan Akinci, eds. *Special Economic Zones: Progress, Emerging Challenges, and Future Directions*. Washington: The World Bank, 2011. http://publications.worldbank.org/index.php?main_page=product_info&products_id=24138.

Garcia, Abraham, and Pierre Mohnen. United Nations University, Maastricht Economic and Social Research and Training Centre on Innovation and Technology: UNU-MERIT. "Impact of Government Support on R&D and Innovation (Working Paper Series #2010-034)." http://www.merit.unu.edu/publications/wppdf/2010/wp2010-034.pdf.

Heston, Alan, Robert Summers, and Bettina Aten. "Penn World Table Version 7.1." *Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania*. Last modified July 2012. https://pwt.sas.upenn.edu/php_site/pwt71/pwt71_form.php.

United States Department of Labor: Bureau of Labor Statistics. "Women at Work: A Visual Essay." *Monthly Labor Review*, October 2003, 45–50. http://www.bls.gov/opub/mlr/2003/10/ressum3.pdf.

Central Intelligence Agency. "The World Factbook: Country Comparison: GDP–Real Growth Rate." https://www.cia.gov/library/publications/the-world-factbook/rankorder/2003rank.html.

Sen, Amartya. "Hunger in the Contemporary World (Discussion Paper DEDPS/8)." *The Suntory Centre: London School of Economics and Political Science*. Last modified November 1997. http://sticerd.lse.ac.uk/dps/de/dedps8.pdf.

Unemployment

Bureau of Labor Statistics. Labor Force Statistics from the Current Population Survey. *Accessed March 6, 2015* http://data.bls.gov/timeseries/LNS14000000.

Cappelli, P. (20 June 2012). "Why Good People Can't Get Jobs: Chasing After the Purple Squirrel." http://knowledge.wharton.upenn.edu/article.cfm?articleid=3027.

Inflation

Sources for Table 22.1:
http://www.eia.gov/dnav/pet/pet_pri_gnd_a_epmr_pte_dpgal_w.htm
http://data.bls.gov/cgi-bin/surveymost?ap
http://www.bls.gov/ro3/apmw.htm
http://www.autoblog.com/2014/03/12/who-can-afford-the-average-car-price-only-folks-in-washington/
https://www.census.gov/construction/nrs/pdf/uspricemon.pdf
http://www.bls.gov/news.release/empsit.t24.htm
http://variety.com/2015/film/news/movie-ticket-prices-increased-in-2014-1201409670/

US Inflation Calculator. "Historical Inflation Rates: 1914-2013." Accessed March 4, 2015. http://www.usinflationcalculator.com/inflation/historical-inflation-rates/.

Bernhard, Kent. “Pump Prices Jump Across U.S. after Katrina.” *NBC News*, September 1, 2005. http://www.nbcnews.com/id/9146363/ns/business-local_business/t/pump-prices-jump-across-us-after-katrina/#.U00kRfk7um4.

Wynne, Mark A. “Core Inflation, A Review of Some Conceptual Issues.” *Federal Reserve Bank of St. Louis*. p. 209. Accessed April 14, 2014. http://research.stlouisfed.org/publications/review/08/05/part2/Wynne.pdf

Shiller, Robert. “Why Do People Dislike Inflation?” *NBER Working Paper Series, National Bureau of Economic Research*, p. 52. 1996.

Wines, Michael. “How Bad is Inflation in Zimbabwe?” *The New York Times*, May 2, 2006. http://www.nytimes.com/2006/05/02/world/africa/02zimbabwe.html?pagewanted=all&_r=0.

Hanke, Steve H. “R.I.P. Zimbabwe Dollar.” *CATO Institute*. Accessed December 31, 2013. http://www.cato.org/zimbabwe.

Massachusetts Institute of Technology. 2015. "Billion Prices Project." Accessed March 4, 2015. http://bpp.mit.edu/usa/.

The International Trade and Capital Flows

Central Intelligence Agency. “The World Factbook.” Last modified October 31, 2013. https://www.cia.gov/library/publications/the-world-factbook/geos/gm.html.

U.S. Department of Commerce. “Bureau of Economic Analysis.” Last modified December 1, 2013. http://www.bea.gov/.

U.S. Department of Commerce. “United States Census Bureau.” http://www.census.gov/.

Tabuchi, Hiroko. “Japan Reports a $78 Billion Trade Deficit for 2012.” *The New York Times*, January 23, 2013. http://www.nytimes.com/2013/01/24/business/global/japan-reports-a-78-billion-trade-deficit-for-2012.html?_r=0.

World Bank. 2014. "Exports of Goods and Services (% of GDP)." Accesed April 13, 2015. http://data.worldbank.org/indicator/NE.EXP.GNFS.ZS/countries.

The Aggregate Demand/Aggregate Supply Model

Keynes, John Maynard. *The General Theory of Employment, Interest and Money*. London: Palgrave Macmillan, 1936.

U.S. Department of Commerce: United States Census Bureau. “New Residential Sales: Historical Data.” http://www.census.gov/construction/nrs/historical_data/.

Library of Economics and Liberty. “The Concise Encyclopedia of Economics: Jean-Baptiste Say.” http://www.econlib.org/library/Enc/bios/Say.html.

Library of Economics and Liberty. “The Concise Encyclopedia of Economics: John Maynard Keynes.” http://www.econlib.org/library/Enc/bios/Keynes.html.

Organization for Economic Cooperation and Development. 2015. "Business Tendency Surveys: Construction." Accessed March 4, 2015. http://stats.oecd.org/mei/default.asp?lang=e&subject=6.

University of Michigan. 2015. "Surveys of Consumers." Accessed March 4, 2015. http://www.sca.isr.umich.edu/tables.html.

The Keynesian Perspective

Mahapatra, Lisa. “US Exports To China Have Grown 294% Over The Past Decade.” *International Business Times*. Last modified July 09, 2013. http://www.ibtimes.com/us-exports-china-have-grown-294-over-past-

decade-1338693.

The Conference Board, Inc. "Global Economic Outlook 2014, November 2013." http://www.conference-board.org/data/globaloutlook.cfm.

Thomas, G. Scott. "Recession claimed 170,000 small businesses in two years." *The Business Journals*. Last modified July 24, 2012. http://www.bizjournals.com/bizjournals/on-numbers/scott-thomas/2012/07/recession-claimed-170000-small.html.

United States Department of Labor: Bureau of Labor Statistics. "Top Picks." http://data.bls.gov/cgi-bin/surveymost?bls.

Harford, Tim. "What Price Supply and Demand?" http://timharford.com/2014/01/what-price-supply-and-demand/?utm_source=dlvr.it&utm_medium=twitter.

National Employment Law Project. "Job Creation and Economic Recovery." http://www.nelp.org/index.php/content/content_issues/category/job_creation_and_economic_recovery/.

Hoover, Kevin. "Phillips Curve." *The Concise Encyclopedia of Economics*. http://www.econlib.org/library/Enc/PhillipsCurve.html.

U.S. Government Printing Office. "Economic Report of the President." http://1.usa.gov/1c3psdL.

Blinder, Alan S., and Mark Zandi. "How the Great Recession Was Brought to an End." Last modified July 27, 2010. http://www.princeton.edu/~blinder/End-of-Great-Recession.pdf.

The Neoclassical Perspective

Lumina Foundation. 2014. "A Stronger Nation Through Higher Education." Accessed March 4, 2015. http://www.luminafoundation.org/publications/A_stronger_nation_through_higher_education-2014.pdf.

The National Bureau of Economic Research. http://www.nber.org/.

U.S. Department of Commerce: United States Census Bureau. "The 2012 Statistical Abstract." http://www.census.gov/compendia/statab/cats/education.html.

U.S. Department of the Treasury. "TARP Programs." Last modified December 12, 2013. http://www.treasury.gov/initiatives/financial-stability/TARP-Programs/Pages/default.aspx.

United States Government. "Recovery.gov: Track the Money." Last modified October 30, 2013. http://www.recovery.gov/Pages/default.aspx.

American Statistical Association. "ASA Headlines." http://www.amstat.org/.

Haubrich, Joseph G., George Pennacchi, and Peter Ritchken. "Working Paper 11-07: Inflation Expectations, Real Rates, and Risk Premia: Evidence from Inflation Swaps." *Federal Reserve Bank of Cleveland*. Last modified March 2011. http://www.clevelandfed.org/research/workpaper/2011/wp1107.pdf.

University of Michigan: Institute for Social Research. "Survey Research Center." http://www.src.isr.umich.edu/.

Carvalho, Carlos, Stefano Eusepi, and Christian Grisse. "Policy Initiatives in the Global Recession: What Did Forecasters Expect?" *Federal Reserve Bank of New York: Current Issues in Economics and Finance*, 18, no. 2 (2012). http://www.newyorkfed.org/research/current_issues/ci18-2.pdf.

Money and Banking

Hogendorn, Jan and Marion Johnson. *The Shell Money of the Slave Trade*. Cambridge University Press, 2003. 6.

Federal Reserve Statistical Release. November 23, 2013. http://www.federalreserve.gov/RELEASES/h6/current/default.htm#t2tg1link.

Credit Union National Association. 2014. "Monthly Credit Union Estimates." Last accessed March 4, 2015. http://www.cuna.org/Research-And-Strategy/Credit-Union-Data-And-Statistics/.

Dallas Federal Reserve. 2013. "Ending `Too Big To Fail': A Proposal for Reform Before It's Too Late". Accessed March 4, 2015. http://www.dallasfed.org/news/speeches/fisher/2013/fs130116.cfm.

Richard W. Fisher. "Ending 'Too Big to Fail': A Proposal for Reform Before It's Too Late (With Reference to Patrick Henry, Complexity and Reality) Remarks before the Committee for the Republic, Washington, D.C. Dallas Federal Reserve. January 16, 2013.

"Commercial Banks in the U.S." Federal Reserve Bank of St. Louis. Accessed November 2013. http://research.stlouisfed.org/fred2/series/USNUM.

Bitcoin. 2013. www.bitcoin.org.

National Public Radio. *Lawmakers and Regulators Take Closer Look at Bitcoin*. November 19, 2013. http://thedianerehmshow.org/shows/2013-11-19/lawmakers-and-regulators-take-closer-look-bitcoin.

Monetary Policy and Bank Regulation

Matthews, Dylan. "Nine amazing facts about Janet Yellen, our next Fed chair." Wonkblog. *The Washington Post*. Posted October 09, 2013. http://www.washingtonpost.com/blogs/wonkblog/wp/2013/10/09/nine-amazing-facts-about-janet-yellen-our-next-fed-chair/.

Appelbaum, Binyamin. "Divining the Regulatory Goals of Fed Rivals." *The New York Times*. Posted August 14, 2013. http://www.nytimes.com/2013/08/14/business/economy/careers-of-2-fed-contenders-reveal-little-on-regulatory-approach.html?pagewanted=3.

U.S. Department of the Treasury. "Office of the Comptroller of the Currency." Accessed November 2013. http://www.occ.gov/.

National Credit Union Administration. "About NCUA." Accessed November 2013. http://www.ncua.gov/about/Pages/default.aspx.

Board of Governors of the Federal Reserve System. "Federal Open Market Committee." Accessed September 3, 2013. http://www.federalreserve.gov/monetarypolicy/fomc.htm.

Board of Governors of the Federal Reserve System. "Reserve Requirements." Accessed November 5, 2013. http://www.federalreserve.gov/monetarypolicy/reservereq.htm.

Cox, Jeff. 2014. "Fed Completes the Taper." Accessed March 31, 2015. http://www.cnbc.com/id/102132961.

Jahan, Sarwat. n.d. "Inflation Targeting: Holding the Line." International Monetary Fund. Accessed March 31, 2015. http://www.imf.org/external/pubs/ft/fandd/basics/target.htm.

Tobin, James. "The Concise Encyclopedia of Economics: Monetary Policy." *Library of Economics and Liberty*. Accessed November 2013. http://www.econlib.org/library/Enc/MonetaryPolicy.html.

Federal Reserve Bank of New York. "The Founding of the Fed." Accessed November 2013. http://www.newyorkfed.org/aboutthefed/history_article.html.

Exchange Rates and International Capital Flows

Friedman, Milton. *Capitalism and Freedom*. Chicago: University of Chicago Press, 1962.

Government Budgets and Fiscal Policy

Kramer, Mattea, et. al. *A People's Guide to the Federal Budget*. National Priorities Project. Northampton: Interlink Books, 2012.

Kurtzleben, Danielle. "10 States With The Largest Budget Shortfalls." *U.S. News & World Report*. January 14,

2011. http://www.usnews.com/news/articles/2011/01/14/10-states-with-the-largest-budget-shortfalls.

Miller, Rich, and William Selway. "U.S. Cities and States Start Spending Again." *BloombergBusinessweek*, January 10, 2013. http://www.businessweek.com/articles/2013-01-10/u-dot-s-dot-cities-and-states-start-spending-again.

Weisman, Jonathan. "After Year of Working Around Federal Cuts, Agencies Face Fewer Options." *The New York Times*, October 26, 2013. http://www.nytimes.com/2013/10/27/us/politics/after-year-of-working-around-federal-cuts-agencies-face-fewer-options.html?_r=0.

Chantrill, Christopher. USGovernmentSpending.com. "Government Spending Details: United States Federal State and Local Government Spending, Fiscal Year 2013." http://www.usgovernmentspending.com/year_spending_2013USbn_15bs2n_20.

Burman, Leonard E., and Joel Selmrod. *Taxes in America: What Everyone Needs to Know*. New York: Oxford University Press, 2012.

Hall, Robert E., and Alvin Rabushka. *The Flat Tax (Hoover Classics)*. Stanford: Hoover Institution Press, 2007.

Kliff, Sarah. "How Congress Paid for Obamacare (in Two Charts)." *The Washington Post: WonkBlog* (blog), August 30, 2012. http://www.washingtonpost.com/blogs/wonkblog/wp/2012/08/30/how-congress-paid-for-obamacare-in-two-charts/.

Matthews, Dylan. "America's Taxes are the Most Progressive in the World. Its Government is Among the Least." *The Washington Post: WonkBlog* (blog). April 5, 2013. http://www.washingtonpost.com/blogs/wonkblog/wp/2013/04/05/americas-taxes-are-the-most-progressive-in-the-world-its-government-is-among-the-least/.

Eisner, Robert. *The Great Deficit Scares: The Federal Budget, Trade, and Social Security*. New York: Priority Press Publications, 1997.

Weisman, Jonathan, and Ashley Parker. "Republicans Back Down, Ending Crisis Over Shutdown and Debt Limit." *The New York Times*, October 16, 2013. http://www.nytimes.com/2013/10/17/us/congress-budget-debate.html.

Wessel, David. *Red Ink: Inside the High-Stakes Politics of Federal Budget*. New York: Crown Publishing Group, 2013.

Alesina, Alberto, and Francesco Giavazzi. *Fiscal Policy after the Financial Crisis (National Bureau of Economic Research Conference Report)*. Chicago: University Of Chicago Press, 2013.

Martin, Fernando M. "Fiscal Policy in the Great Recession and Lessons from the Past." Federal Reserve Bank of St. Louis: *Economic Synopses*. no. 1 (2012). http://research.stlouisfed.org/publications/es/12/ES_2012-01-06.pdf.

Bivens, Josh, Andrew Fieldhouse, and Heidi Shierholz. "From Free-fall to Stagnation: Five Years After the Start of the Great Recession, Extraordinary Policy Measures Are Still Needed, But Are Not Forthcoming." *Economic Policy Institute*. Last modified February 14, 2013. http://www.epi.org/publication/bp355-five-years-after-start-of-great-recession/.

Lucking, Brian, and Dan Wilson. Federal Reserve Bank of San Francisco, "FRBSF Economic Letter—U.S. Fiscal Policy: Headwind or Tailwind?" Last modified July 2, 2012. http://www.frbsf.org/economic-research/publications/economic-letter/2012/july/us-fiscal-policy/.

Greenstone, Michael, and Adam Looney. Brookings. "The Role of Fiscal Stimulus in the Ongoing Recovery." Last modified July 6, 2012. http://www.brookings.edu/blogs/jobs/posts/2012/07/06-jobs-greenstone-looney.

Leduc, Sylvain, and Daniel Wilson. Federal Reserve Bank of San Francisco: Working Paper Series. "Are State Governments Roadblocks to Federal Stimulus? Evidence from Highway Grants in the 2009 Recovery Act.

(Working Paper 2013-16).” Last modified July 2013. http://www.frbsf.org/economic-research/files/wp2013-16.pdf.

Lucking, Brian, and Daniel Wilson. “FRBSF Economic Letter-Fiscal Headwinds: Is the Other Shoe About to Drop?” *Federal Reserve Bank of San Francisco*. Last modified June 3, 2013. http://www.frbsf.org/economic-research/publications/economic-letter/2013/june/fiscal-headwinds-federal-budget-policy/.

Recovery.gov. “Track the Money.” http://www.recovery.gov/Pages/default.aspx.

Bastagli, Francesca, David Coady, and Sanjeev Gupta. International Monetary Fund. “IMF Staff Discussion Note: Income Inequality and Fiscal Policy.” Last modified June 28, 2012. http://www.imf.org/external/pubs/ft/sdn/2012/sdn1208.pdf.

The Impacts of Government Borrowing

The White House. “This is why it's time to make college more affordable.” Last modified August 20, 2013. http://www.whitehouse.gov/share/college-affordability.

Rubin, Robert E., Peter R. Orszag, and Allen Sinai. “Sustained Budget Deficits: Longer-Run U.S. Economic Performance and the Risk of Financial and Fiscal Disarray.” Last modified January 4, 2004. http://www.brookings.edu/~/media/research/files/papers/2004/1/05budgetdeficit%20orszag/20040105.pdf.

U.S. Department of Commerce: Bureau of Economic Analysis. “National Data: National Income and Product Accounts Tables.” Accessed December 1, 2013. http://www.bea.gov/iTable/iTable.cfm?ReqID=9&step=1#reqid=9&step=3&isuri=1&910=X&911=0&903=146&904=2008&905=2013&906=A.

Board of Governors of the Federal Reserve System, “Selected Interest Rates (Daily) – H.15.” Accessed December 10, 2013. http://www.federalreserve.gov/releases/h15/data.htm.

The White House. “Fiscal Year 2013 Historical Tables: Budget of the U.S. Government.” Accessed December 12, 2013. http://www.whitehouse.gov/sites/default/files/omb/budget/fy2013/assets/hist.pdf.

The National Science Foundation. Accessed December 19, 2013. http://www.nsf.gov/.

Macroeconomic Policy Around the World

International Labour Organization. “Global Employment Trends for Youth 2013.” http://www.ilo.org/global/research/global-reports/global-employment-trends/youth/2013/lang--en/index.htm

International Monetary Fund. “World Economic and Financial Surveys: World Economic Outlook—Transitions and Tensions.” Last modified October 2013. http://www.imf.org/external/pubs/ft/weo/2013/02/pdf/text.pdf.

Nobelprize.org. “The Prize in Economics 1987 - Press Release.” *Nobel Media AB 2013*. Last modified October 21, 1987. http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/1987/press.html.

Redvers, Louise. BBC News Business. “Youth unemployment: The big question and South Africa.” Last modified October 31, 2012. http://www.bbc.co.uk/news/business-20125053.

The World Bank. “The Complete World Development Report Online.” http://www.wdronline.worldbank.org/.

The World Bank. “World DataBank.” http://databank.worldbank.org/data/home.aspx.

Todaro, Michael P., and Stephen C Smith. *Economic Development (11thEdition)*. Boston, MA: Addison-Wesley: Pearson, 2011, chap. 1–2.

“Shinzo Abe’s Government Looks Likely to Disappoint on Fiscal Consolidation.” *The Economist*, May 4, 2013. http://www.economist.com/news/finance-and-economics/21577080-shinzo-abes-government-looks-likely-disappoint-fiscal-consolidation-dont.

Banerjee, Abhijit V., and Esther Duflo. *Poor Economics*. "About the Book: Overview." http://pooreconomics.com/about-book.

CARE International. "About Us." Accessed January 14, 2014. http://www.care-international.org/about-us.aspx.

Central Intelligence Agency. "The World Factbook: Africa, Burundi." Last modified November 12, 2013. https://www.cia.gov/library/publications/the-world-factbook/geos/by.html.

Central Intelligence Agency. "The World Factbook: Africa, Democratic Republic of the Congo." Last modified November 12, 2013. https://www.cia.gov/library/publications/the-world-factbook/geos/cg.html.

Easterly, William. *The White Man's Burden: Why the West's Efforts to Aid the Rest Have Done So Much Ill and So Little Good*. Penguin Group (USA), 2006.

Goel, Vindu. "Facebook Leads an Effort to Lower Barriers to Internet Access," *The New York Times.* Last modified August 20, 2013.

Google. "Project Loon." http://www.google.com/loon/.

GOV.UK. "Department for International Development." https://www.gov.uk/government/organisations/department-for-international-development.

Moyo, Dambisa. *Dead Aid: Why Aid Is Not Working and How There Is Another Way in Africa*. Penguin, 2010.

Field, Erica, Rohini Pande, Natalia Rigol, Simone Schaner, and Charity Troyer Moore. 2021. "On Her Own Account: How Strengthening Women's Financial Control Impacts Labor Supply and Gender Norms," *American Economic Review*, 111(7): 2342–2375.

The World Bank. "World Bank Country and Lending Rules." https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.

The World Bank. "Millennium Development Goals." http://www.worldbank.org/mdgs/.

Todaro, Michael P., and Stephen C Smith. *Economic Development (11th Edition)*. Boston, MA: Addison-Wesley: Pearson, 2011, chap. 3.

Vercillo, Siera. "The Failures of Canadian Foreign Aid: Tied, Mismanaged and Uncoordinated." *The Attaché Journal of International Affairs*. (2010). http://theattachejia.files.wordpress.com/2013/10/the-attache-2010-issue.pdf.

Viscusi, Gregory, and Mark Deen. "Why France Has So Many 49-Employee Companies." *Business Week*. Last modified May 3, 2012. http://www.businessweek.com/articles/2012-05-03/why-france-has-so-many-49-employee-companies.

Edwards, S. (n.d.). "America's Unsustainable Current Account Deficit." *National Bureau of Economic Research Digest*. http://www.nber.org/digest/mar06/w11541.html. http://www.ustr.gov/trade-agreements/free-trade-agreements/north-american-free-trade-agreement-nafta.

New Country Classifications | Data. (n.d.). Accessed January 14, 2014. http://data.worldbank.org/news/new-country-classifications.

Office of the United States Trade Representative: Executive Office of the President. "North American Free Trade Agreement (NAFTA)."

Why India's Labour Laws are a Problem. (2006, May 18). *BBC*. May 18, 2006. http://news.bbc.co.uk/2/hi/south_asia/4984256.stm.

International Trade

Krugman, Paul R. *Pop Internationalism*. The MIT Press, Cambridge. 1996.

Krugman, Paul R. "What Do Undergrads Need to Know about Trade?" *American Economic Review* 83, no. 2. 1993. 23-26.

Ricardo, David. *On the Principles of Political Economy and Taxation*. London: John Murray, 1817.

Ricardo, David. "On the Principles of Political Economy and Taxation." *Library of Economics and Liberty.* http://www.econlib.org/library/Ricardo/ricP.html.

Bernstein, William J. *A Splendid Exchange: How Trade Shaped the World*. Atlantic Monthly Press. New York. 2008.

U.S. Census Bureau. 2015. "U.S. International Trade in Goods and Services: December 2014." Accessed April 13, 2015. http://www.bea.gov/newsreleases/international/trade/2015/pdf/trad1214.pdf.

U.S. Census Bureau. U.S. Bureau of Economic Analysis. 2015. "U.S. International Trade in Goods and Services February 2015." Accessed April 10, 2015. https://www.census.gov/foreign-trade/Press-Release/current_press_release/ft900.pdf.

Vernengo, Matias. "What Do Undergraduates Really Need to Know About Trade and Finance?" in *Political Economy and Contemporary Capitalism: Radical Perspectives on Economic Theory and Policy*, ed. Ron Baiman, Heather Boushey, and Dawn Saunders. M. E. Sharpe Inc, 2000. Armonk. 177-183.

World Trade Organization. "The Doha Round." Accessed October 2013. http://www.wto.org/english/tratop_e/dda_e/dda_e.htm.

The World Bank. "Data: World Development Indicators." Accessed October 2013. http://data.worldbank.org/data-catalog/world-development-indicators.

Globalization and Protectionism

Bureau of Labor Statistics. "Industries at a Glance." Accessed December 31, 2013. http://www.bls.gov/iag/.

Oxfam International. Accessed January 6, 2014. http://www.oxfam.org/.

Bureau of Labor Statistics. "Data Retrieval: Employment, Hours, and Earnings (CES)." Last modified February 1, 2013. http://www.bls.gov/webapps/legacy/cesbtab1.htm.

Dhillon, Kiran. 2015. "Why Are U.S. Oil Imports Falling?" Time.com. Accessed April 1, 2015. http://time.com/67163/why-are-u-s-oil-imports-falling/.

Kristof, Nicholas. "Let Them Sweat." *The New York Times*, June 25, 2002. http://www.nytimes.com/2002/06/25/opinion/let-them-sweat.html.

Kohut, Andrew, Richard Wike, and Juliana Horowitz. "The Pew Global Attitudes Project." *Pew Research Center*. Last modified October 4, 2007. http://www.pewglobal.org/files/pdf/258.pdf.

Lutz, Hannah. 2015. "U.S. Auto Exports Hit Record in 2014." Automotive News. Accessed April 1, 2015. http://www.autonews.com/article/20150206/OEM01/150209875/u.s.-auto-exports-hit-record-in-2014.

United States Department of Labor. Bureau of Labor Statistics. 2015. "Employment Situation Summary." Accessed April 1, 2015. http://www.bls.gov/news.release/empsit.nr0.htm.

United States Department of Commerce. "About the Department of Commerce." Accessed January 6, 2014. http://www.commerce.gov/about-department-commerce.

United States International Trade Commission. "About the USITC." Accessed January 6, 2014. http://www.usitc.gov/press_room/about_usitc.htm.

E. Helpman, and O. Itskhoki, "Labour Market Rigidities, Trade and Unemployment," *The Review of Economic Studies*, 77. 3 (2010): 1100-1137.

M.J. Melitz, and D. Trefler. "Gains from Trade when Firms Matter." *The Journal of Economic Perspectives*, 26.2 (2012): 91-118.

Rauch, J. "Was Mancur Olson Wrong?" *The American*, February 15, 2013. http://www.american.com/archive/2013/february/was-mancur-olson-wrong.

Office of the United States Trade Representative. "U.S. Trade Representative Froman Announces FY 2014 WTO Tariff-Rate Quota Allocations for Raw Cane Sugar, Refined and Specialty Sugar and Sugar-Containing Products."Accessed January 6, 2014. http://www.ustr.gov/about-us/press-office/press-releases/2013/september/WTO-trq-for-sugar.

The World Bank. "Merchandise trade (% of GDP)." Accessed January 4, 2014. http://data.worldbank.org/indicator/TG.VAL.TOTL.GD.ZS.

World Trade Organization. 2014. "Annual Report 2014." Accessed April 1, 2015. https://www.wto.org/english/res_e/booksp_e/anrep_e/anrep14_chap10_e.pdf.

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