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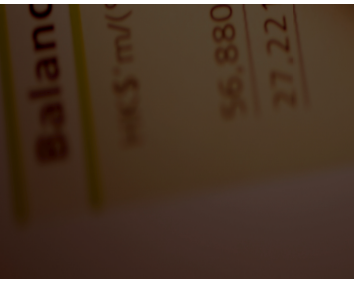
A Primer on Macroeconomics, Volume II

Policies and Perspectives

Second Edition

Thomas M. Beveridge



BEP BUSINESS EXPERT PRESS

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Abstract

Economics, far from being the "dismal science," offers us valuable lessons that can be applied to our everyday experiences. At its heart, economics is the science of choice and a study of economic principles that allows us to achieve a more informed understanding of how we make our choices, regardless of whether these choices occur in our everyday life, in our work environment, or at the national or international level.

The present two-volume text represents a commonsense approach to basic macroeconomic principles. It is directed toward all students, but particularly toward those within business school settings, including students beginning an advanced business degree course of study. It will deliver clear statements of essential economic principles, supported by easy to understand examples, and uncluttered by extraneous material, the goal being to provide a concise readable primer that covers the substance of macroeconomic theory.

This volume uses a single unifying tool—aggregate demand and aggregate supply analysis—to probe differing perspectives on macroeconomic policies.

Keywords

aggregate price level, business cycle, comparative advantage, crowding-out effect, demand and supply, deposit multiplier, economic growth, equilibrium, expenditure multiplier, fiscal and monetary policies, GDP, inflation rate, international trade issues, opportunity cost, recession, stabilization, unemployment rate

Contents

Preface

This two-part *Primer on Macroeconomics* has been long in the writing. It has been shaped by after-class discussions with students over many years while we tried to break down economics into understandable concepts and examples. A former student, Dr. Jeff Edwards, now Chairman of the Economics Department at North Carolina A&T State University, requested that I write an introductory text, and advised "Make it like your lectures."

No book, at least no book that I'm capable of writing, can capture the immediacy and intimacy of a classroom environment but, equally, no classroom environment permits the opportunity to dwell on detail quite as effectively as the pages of a book. As with everything in economics, there are trade-offs.

I've devised this *Primer* to help you to master the concepts in what may to be your first, and perhaps only, economics course. I've given you opportunities to apply these concepts in real-world situations. Most economists stress the need for competence in three major areas—the application of economic concepts to real-world situations, the interpretation of graphs, and the analysis of numerical problems. This *Primer* allows you to develop and hone these important skills.

Throughout the text, I've attempted to maintain the sense of a dialogue—there are frequent "THINK IT THROUGH" pauses, with which you can review and check your grasp of the topic under discussion and relate it to real-world applications.

I hope that this book will ignite in you a passion for economics that will blaze for a lifetime. Economics surrounds us—it fills the airwaves, our daily lives, our hopes, and our dreams. Learning how to apply economic concepts to our world creates a better and more durable understanding, and a reasonable goal for a noneconomics major is to have sufficient insight to evaluate the economic content of articles in *The Wall Street Journal* or *The Economist* or the views expressed by commentators on CNN or Fox.

This *Primer* has been written with the hope that, long after you have turned the final page, you will retain a deeper understanding of the economic issues that confront us and the tools to analyze the exciting and challenging concerns that we all must address in our contemporary world.

My best wishes to you in your study of economics. You will find it a rewarding and worthwhile experience, and I trust that this *Primer* will stimulate you in your endeavors.

Acknowledgments

Through the years, many students have asked me questions and, by doing so, have given me deeper insights into the difficulties that arise when economics is first approached. I am grateful to all of them. Much of the material included in this book springs from such "after-class" discussions.

The efforts of reviewers Phil Romero and Jeff Edwards have added greatly to the quality of the final product. A former student, Jonas Feit, now thriving in Washington, DC, critiqued early drafts of the first edition. Scott Isenberg and Charlene Kronstedt provided stalwart support. Rene Caroline Balan of S4Carlisle Publishing Services deserves great credit for keeping things moving smoothly by encouraging and cajoling. Denver Harris was reliable in converting a misshapen poorly written first-edition manuscript into an orderly text. Needless to say, any remaining *lapsi calami* are my responsibility.

This *Primer* is dedicated, with love, to the memory of my parents, to my wife, Pamela, (a software instructor with Microsoft Certification), to our son, Andrew (whose surprises are no longer shocks but delights), and to the dogs and cats, and especially for Baby, for whom all lunches are free.

Thomas M. Beveridge
Hillsborough, North Carolina

CHAPTER 5

Aggregate Demand and Aggregate Supply

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

- Define aggregate demand and explain why the aggregate demand curve has a negative slope.
- Identify seven factors that can shift the position of the aggregate demand curve.
- Describe how aggregate demand is affected by fiscal and monetary policy actions.
- Distinguish between the short run and the long run.
- Explain the slope and location of the long-run aggregate supply curve.
- Explain the slope of the short-run aggregate supply curve and its relationship to the long-run aggregate supply curve.
- Identify the factors that shift the long-run and short-run aggregate supply curves.
- Explain how the economy achieves short-run equilibrium.
- Outline the operation of the self-correcting mechanism and its relevance to the achievement of long-run equilibrium.
- Distinguish the beliefs of the Classical economists from those of the Keynesians.
- Describe the role of the expenditure multiplier in the macroeconomy.

In Volume I, we identified the major elements and models that economists use to study our world of choices—the chief being, of course, demand and supply analysis. In this volume, we will dig deeper into these

principles and use them to discover how policies and perspectives influence our economic well-being.

In this chapter you may gain some insights into yourself and your own beliefs. Do you favor dealing with short-run problems as they arise because "in the long run we're all dead," or do you subscribe to the view that we should "stay the course," not be distracted by short-term troubles, and let long-term objectives dominate our actions? Each is a valid preference—there is no one-size-fits-all answer.

The great majority of car drivers believe that they are better drivers than the great majority of car drivers! Each of us believes that we are above average because each of us tends to overvalue those skills in which we are most proficient and to discount those skills in which we are least proficient. Fast drivers believe that the ability to drive fast reveals mastery, whereas slow drivers believe that prudence and consideration for other road users are the true mark of the "good" driver. We each have biases that influence our perception of the world. So, too, with economics.

Chapter Preview: In Chapter 1 (Volume I) we discovered the benefits of exchange and, later in Volume I, in Chapter 2, we elaborated that analysis by developing the demand and supply model. Further, Chapters 3 and 4 have given us some of the measures used to monitor economic performance. In this chapter we turn our attention to our main tool of macroeconomic analysis—aggregate demand and aggregate supply, or the ADAS model.

Aggregate Demand

In this section we define aggregate demand, outline the appearance of the aggregate demand (AD) curve and the reasons for that appearance, and consider the factors that can shift the position of the curve.

Aggregate demand is the total amount of intended spending on a nation's final goods and services by its households, firms, the government sector, and foreigners. The **aggregate demand curve** depicts the negative relationship between the quantity of aggregate output (real GDP) demanded and the aggregate price level (P) as shown in Figure 5.1.

We discussed real GDP (y) in Chapter 3 (Volume I), and the aggregate price level (P) in Chapter 4 (Volume I), but let us review. Real GDP is our measure of aggregate output, measured in constant dollars. The aggregate

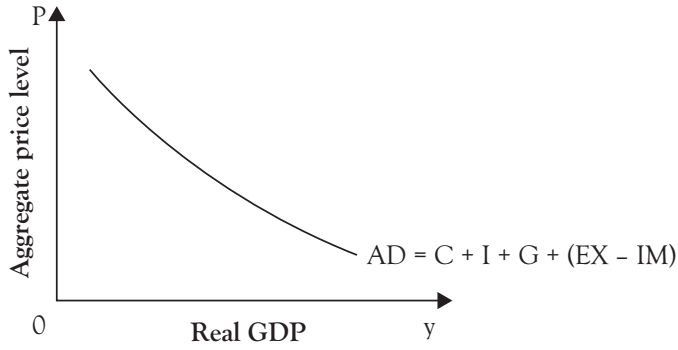

Figure 5.1 The aggregate demand curve

price level is our measure of the overall average price of goods and services, as measured by the Consumer Price Index or the GDP price deflator.

Composition of Aggregate Demand: From Chapter 3 and the Expenditure Approach to calculating GDP, recall that the demand for goods and services is composed of expenditures by households (consumption, C), businesses (investment, I), government (government purchases, G), and foreigners (net exports, EX – IM). Aggregate demand, then, is composed of these elements:

$$AD = C + I + G + (EX - IM)$$

What the AD curve *isn't*. Although the AD curve looks very similar to the demand curves we have seen in previous chapters, it is different in significant ways—it's not just a "big" demand curve.

Note that, on the vertical axis, "price" is the aggregate price level (P). In the "demand for oranges" diagram, the price of one good (oranges) is on the price axis—here, the aggregate price level is the price of *all* goods and services in the macroeconomy. The distinction is important. In Chapter 2, when we considered the behavior of quantity demanded in a single market such as the market for oranges, we assumed that, if the price of oranges were to rise, then all other factors would be held constant—the *ceteris paribus* assumption. A change in the price of oranges would occur in isolation, without changes in income, wealth, prices of other goods, and so on. If the price of oranges were to rise, consumers would become less willing and less able to buy oranges and a negative relationship between price and quantity demanded would be revealed. The AD curve tells a different story.

Comment: In a microeconomics course, two effects—the substitution effect and the income effect—are identified as influencing the behavior of consumers, and, since the AD curve *looks* like the demand curves we have seen before, it is tempting to apply the same logic when wishing to explain demand behavior. In this case, however, it is incorrect to extend the logic that is applicable in one market to overall macro demand across many markets.

The *ceteris paribus* assumption does not apply at the macroeconomic level because, as the aggregate price level rises, not all prices change in the same direction or at the same rate and also because changing prices reflect changing real spending power. If, as appears to be the case from Figure 5.1, the AD curve has a negative slope, then different reasons will have to be found to explain that slope.

The Slope of the Aggregate Demand Curve

We can identify three reasons for the aggregate demand curve's negative slope. In each case, we examine the effect on quantity demanded of an increase in the aggregate price level. For practice, consider a decrease in the aggregate price level and see if you can reverse the argument.

The Wealth Effect (Real Balance Effect)

An increase in the overall price level causes a decrease in household wealth. Certainly, with higher prices, there is a decline in the real value of the money balances of consumers (the dollars in one's wallet and one's other assets that are fixed in money terms, such as the savings in a bank account)—those dollars are worth less as the price level increases. In addition, other assets—such as the funds in one's 401k or the value of one's house—may fail to keep pace with the overall rise in prices. If so, households become less well off and, with less real wealth, overall consumption spending will decrease. An increase in the aggregate price level reduces consumption spending.

The Real Interest Rate Effect

An increase in the overall price level means that there is a greater demand for cash with which to finance transactions. An increase in the demand for a product, such as oranges, causes an increase in the price of that

good. In a similar way, an increase in the demand for money increases the "price" of money. The interest rate is the "price" of money. Accordingly, an increase in the aggregate price level would will cause the interest rate (the real cost of borrowing) to increase. Because higher real interest rates discourage borrowing by firms for investment projects and by households for consumption expenditures, we should expect to see less investment and consumption spending as the aggregate price level increases.

Comment: An alternative way to interpret this effect, with respect to households, is to realize that the interest rate is the "reward" for saving.

The incentive to save increases as the interest rate increases and, as we know, saving and consumption are two aspects of the same decision—as we save more of our income, we spend less of it.

THINK IT THROUGH: Figure 5.2 shows two aggregate demand curves, AD_1 and AD_2.

One of the curves is that of a country (Country A) whose citizens follow the adage "never a borrower nor a lender be," and who avoid credit transactions whereas the other AD curve is that of a country (Country B) whose citizens indulge in a great many credit transactions. Suppose the economy's aggregate price level is initially P_0 and that it decreases to P_1. Focusing purely on the real interest rate effect, can you reason out which curve goes with which country?

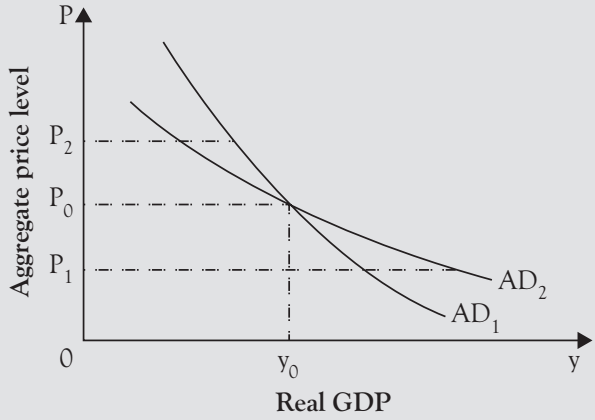

Figure 5.2 The slope of the AD curve

The AD curve, AD_1, is associated with Country A. The real interest rate effect tells us that, as the aggregate price level decreases, the real interest rate will decrease. In Country A (where little borrowing occurs), this decline will have little impact on households or firms and aggregate quantity demanded will increase only modestly. In Country B, however, the same decrease in interest rate will prompt greater increases in borrowing, consumption, and investment, and aggregate quantity demanded will increase more aggressively. The stronger the real interest rate effect, the flatter the AD curve.

The Foreign Trade Effect

An increase in the aggregate price level for American goods encourages domestic purchasers to buy foreign goods whose prices have now become relatively cheaper. Imports will increase, reducing the quantity of American goods demanded. Simultaneously, exports will decrease as foreigners are put off by the comparatively higher prices of American goods. An increase in the aggregate price level reduces net exports and, therefore, aggregate demand.

THINK IT THROUGH: Consider Figure 5.2 once more. Let us suppose that one of the two curves is that of a country that is very "open" to foreign trade (the Netherlands), whereas the other AD curve is that of a country that is comparatively self-contained and experiences very little foreign trade (Nepal). Suppose the economy's aggregate price level is initially P_0 and that it increases to P_2. Focusing only on the foreign trade effect, can you reason out which curve goes with which country?

The steeper AD curve, AD_1, is associated with Nepal and the flatter AD curve, AD_2, is associated with the Netherlands. The foreign trade effect states that, as the aggregate price level increases, net exports will decrease. In Nepal, the effect on aggregate quantity demanded will be slight but, in the Netherlands, a substantial contraction in aggregate quantity demanded will take place. The stronger the foreign trade effect, the flatter the AD curve.

Factors That Can Shift the Aggregate Demand Curve

The three effects just described explain why the aggregate demand curve is negatively sloped. What, though, may cause the AD curve to shift position?

Except for a change in the aggregate price level or real GDP, anything that causes intended consumption, investment, government spending, or net exports to change will cause the AD curve to shift position—to the right for an increase in aggregate demand, as shown in Figure 5.3, and to the left for a decrease. We identify seven major factors.

Government Policy

Fiscal and monetary policies are the two broad branches of government economic policy. Fiscal policy is intended to manipulate the economy through changes in government spending and net taxes, and monetary policy operates through changes in the financial sector. An *expansionary* policy is intended to make the economy grow by shifting the AD curve to the right whereas a *contractionary* policy's intent is to dampen down economic activity by shifting the AD curve to the left.

Fiscal Policy: **Government spending** (G) *is* one of the components of aggregate demand—an increase in government spending will shift the aggregate demand to the right—an expansionary fiscal policy. **Net taxes** (T), or *taxes minus transfers*, are taxes paid to the government by firms and households less transfer payments received by households and firms. A decrease in net taxes (either a decrease in personal taxes or an increase in transfer payments to households) would boost disposable income and encourage increased consumption, shifting the AD curve to the right—an

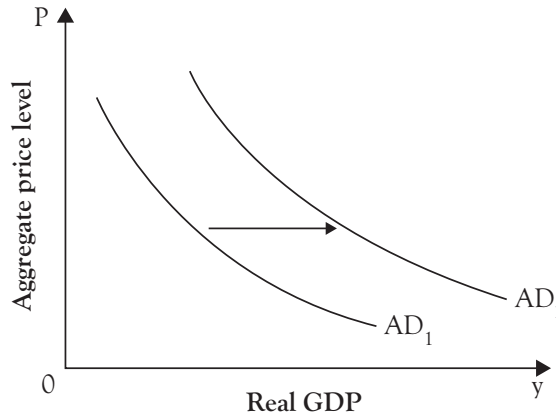

Figure 5.3 An increase in aggregate demand

expansionary fiscal policy. Further, the introduction of a policy such as an investment-tax credit, or reduced taxes on corporate income, would stimulate additional investment spending. Decreasing government spending or increasing net taxes will shift the AD curve to the left. In Chapter 6, we will consider expansionary and contractionary fiscal policy actions in more detail.

Monetary Policy: An increase in the supply of money should decrease the "price" of money (the real interest rate) and reduce the cost of borrowing. A lower interest rate will encourage additional borrowing by firms for investment purposes and by households for consumption. An increase in the money supply is an *expansionary* policy and will shift the AD curve to the right. A *contractionary* monetary policy (a decrease in the money supply) will shift the aggregate demand curve to the left. In Chapter 7, we look more closely at how monetary policy is conducted.

Wealth: We know that household wealth can be influenced, via the wealth effect, by changes in the aggregate price level. However, wealth may change without changes in the overall price level if, for example, there is a stock market boom. With greater wealth, consumption spending will increase and the AD curve will shift to the right. A Wall Street collapse will shift the AD curve to the left.

Expectations: The current spending plans of consumers and business owners are affected by optimism and pessimism about future conditions including wealth, profits, income, and job security. John Maynard Keynes referred to "animal spirits" (bullishness and bearishness) as a force shaping particularly the behavior of firms—after all, the act of business investment is a vote of confidence in the future health and profitability of the economy. If the public is convinced that better times are ahead, then current consumption spending and investment will increase. However, if we are convinced that the incoming Administration will cut benefits and raise taxes then we will moderate our spending today in anticipation of hard times ahead.

THINK IT THROUGH: The dot com boom of the 1990s swelled stock portfolios and fueled expectations of further prosperity and, consequently, consumers purchased more enthusiastically than would otherwise have been the case—financing their behavior by running up consumer credit.

THINK IT THROUGH: In the depths of the Great Depression, Franklin D. Roosevelt stated, "we have nothing to fear but fear itself." Anxiety about unemployment induced consumers to trim back on spending, leading to the decreases in the aggregate demand that resulted in the unemployment they feared. President Reagan's "Morning in America" advertising campaign emphasized future prosperity and President Obama's keynote phrase, "hope and change," was coined to instill optimism in the midst of economic gloom.

Foreign Economic Conditions: Foreigners demand American goods. If there is an economic downturn in a trading partner such as Japan, then American exports to Japan will suffer. Also, adjustments in the trade environment, such as the imposition of *tariffs* (taxes on imported goods) or *quotas* (limitations on the number of items that can be imported), can cause the level of net exports to change.

THINK IT THROUGH: During times of economic hardship, there is a tendency toward increased "protectionism," clamping down of imports through tariffs or quotas or, perhaps, appeals to patriotism.

Exchange Rates: The international price of the dollar can be affected by factors such as expectations about the performance of trading partners, expectations about future interest rates, or speculation. A decline in confidence in the euro, for example, would provoke an increased demand for the dollar, causing the dollar to appreciate in value. As we saw in Chapter 2 (Volume I), when the dollar becomes stronger, American consumers are able to buy more imports but American firms

find it more difficult to sell exports—net exports decrease, causing the aggregate demand curve to shift to the left.

Since the introduction, in 1999, of the euro and the demise of national currencies within the eurozone, the results have been markedly beneficial for Germany's trade position. If the deutsche mark had remained as Germany's currency, then, with such a strong exporting position, the mark would have been forced to appreciate, making German goods more expensive for foreign buyers and foreign goods more attractive to Germans. However, because other members of the eurozone were in weaker trade positions than Germany, the common currency's value was less than it would have been if it had been determined solely by Germany. Accordingly, German exports (valued in euros) were able to maintain their competitive edge and Germany's export sector flourished.

Income Distribution: Those with lower incomes typically spend a greater proportion of their income than do those who are more prosperous. Similarly, wage earners usually spend more of their income than do those who earn profits. Given the overall income level, an increase in the distribution of income toward wage earners and the comparatively poor and away from the wealthy and those who earn profits, through taxes and transfers, will lead to increased spending.

THINK IT THROUGH: The assumption is that those who save do not convert their funds into investment spending. If they do, however, then the income redistribution would lead to a change in the composition of spending rather than a change in its level.

Demographics: As the demographic structure of the population evolves, the types of goods and services households wish to buy change too. A youthful population will seek starter homes, college degrees, and cars whereas an aging population will desire cataract surgery and hip replacements. The *life-cycle hypothesis of consumption* suggests that individuals

seek to maintain a fairly steady standard of living throughout life and, therefore, for retirees, consumption spending is high relative to their current income (as they live off their savings). Similarly, the young borrow and spend at a comparatively high rate, based on expected future earnings whereas middle-aged income earners tend to spend less and save more for their golden years. If there is a demographic bulge, such as the baby-boomers, then it will influence the composition and the level of consumption over time.

Review: We have developed a model for the overall demand for goods and services in the macroeconomy by the private sector, the public sector, and the foreign sector. As the aggregate price level increases, the amount of final goods and services demanded is reduced—the AD curve is negatively sloped. We have identified a number of factors that can shift the position of the AD curve.

Aggregate Supply: The Long Run and the Short Run

In this section we define aggregate supply and distinguish between the long run and the short run. We then consider the appearance of the long-run aggregate supply (LRAS) curve and the short-run aggregate supply (SRAS) curve, the relationship between the two and the factors that cause the curves to shift.

Aggregate supply is the total output of final goods and services (real GDP) produced by the economy and an **aggregate supply curve** shows the relationship between the quantity of aggregate output that producers are willing and able to supply and the aggregate price level (P). Whereas there is only one aggregate demand curve, the aggregate supply curve's behavior depends intimately on the particular time period being considered. We define two time periods—the *long run* and the *short run*—and, therefore, we have *two* aggregate supply curves—the *LRAS* curve and the *SRAS* curve.

The **long run** is a period of time that is sufficiently long to permit resource markets to adjust fully to a change in the aggregate price level whereas, in the **short run**, resource markets do not have sufficient time to adjust fully to a change in the aggregate price level.

THINK IT THROUGH: The distinction between the long run and the short run can be confusing. Focus on the long run first. In the long run, temporary discrepancies (between rates of increase in prices and wages, for example, or between workers' expectations and actual outcomes) have time to disappear. As we will see, price changes have no effect on long-run employment or output decisions. In the short run, by contrast, we can make errors, with firms and workers in particular failing to read price signals correctly. In the long run, having learned from and made adjustments for our temporary mistakes, their influence disappears.

An obvious question to ask at this point is, "How long does it take for input markets to respond completely to a change on the aggregate price level?" Unfortunately, there is little consensus among economists on this point and we will discuss the significance of this lack of agreement later. Given that, today, the *average* length of a labor contract is about 3 years, we might feel confident in assuming, as a rule of thumb, that it is unlikely that the economy will achieve the long run much sooner than 5 years after a significant price shock.

The Long-Run Aggregate Supply Curve

The Slope of the Long-Run Aggregate Supply Curve

Let us first consider the long-run relationship between aggregate output and the aggregate price level. To do this, we will revisit the labor market diagram that we first saw in Chapter 2 and let this be a proxy for all resource markets.

In Figure 5.4, the demand (D) curve is the demand for workers by employers—at higher wages, fewer workers will be demanded as firms seek to trim labor costs. The supply (S) curve is the supply of labor by workers seeking jobs—at higher wages, workers will be willing to work for a greater number of hours. The vertical axis measures *real wage per hour*. When we work, we do not work for the number of dollars we receive—the nominal wage—we work for the goods those dollars will buy—the real wage. The real wage (w) is the nominal wage (W) divided by the aggregate price level (P).

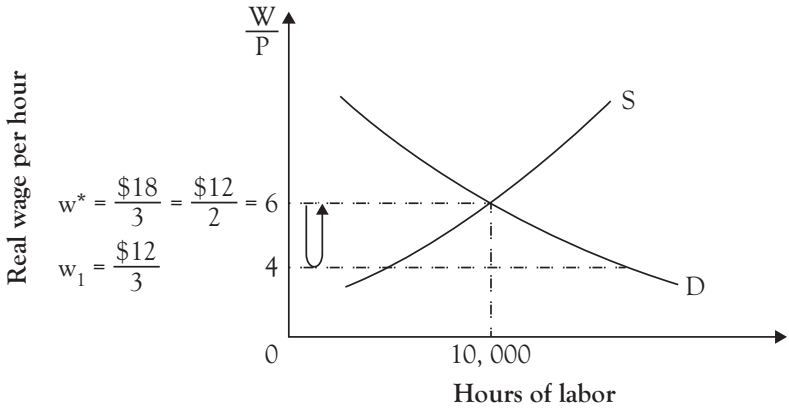

Figure 5.4 The labor market

THINK IT THROUGH: To determine whether a job offer is attractive or not, we need to know the nominal wage and also the price of the goods we wish to buy with that wage, in other words, the real wage. A job offer of $12 per hour is meaningless—it can be evaluated only if we know how much those dollars are worth. If the price of a unit of consumption (a loaf of bread, perhaps) is $3, then the employer's offer of $12 is worth four loaves of bread. If the price of bread rises to $4, then the employer's offer of $12 is worth only three loaves of bread.

Let us suppose that, initially, the labor market is in equilibrium. The equilibrium real wage (w*) is 6 units of consumption per hour. If the aggregate price level is $2, then the nominal wage must be $12 per hour. The equilibrium quantity of labor is 10,000 hours and this quantity of inputs will generate some particular amount of production—say, 900 units of output.

THINK IT THROUGH: In equilibrium, the quantity of labor demanded equals the quantity of labor supplied—there is a job for every worker participating in the labor market. The economy is at full employment, with only some unavoidable frictional and structural unemployment present. The full-employment output level, therefore, is 900 units of production.

We have a point on the LRAS curve! When the aggregate price level is $2, real GDP is 900 units of output, as shown at point A in Figure 5.5.

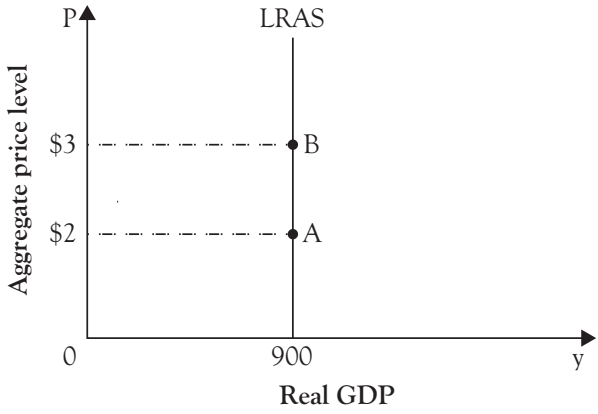

Figure 5.5 The long-run aggregate supply curve

If the aggregate price level increases to $3, but the nominal wage remains at $12 per hour, then the real wage shrinks to 4 units of consumption (w_1) and there is a shortage in the labor market as shown in Figure 5.4. Because of the labor shortage, workers can bid up the nominal wage they receive until the equilibrium real wage is restored. Given the aggregate price level, equilibrium will be restored only when the nominal wage increases to $18 per hour. The negotiating process that bids up the nominal wage will take some time and, during that period of transition, the economy is operating in the short run. It is only when the real wage is restored to its equilibrium level of 6 units of consumption and the market is clearing that the long run has been reached.

After equilibrium has been restored, 10,000 hours of labor are being hired and, with those hours, 900 units of output are being produced. In the long run, when the aggregate price level is $3, then real GDP is 900 units of output, as shown at point B. We can conclude that the LRAS curve is vertical. Real GDP is unaffected by price level changes in the long run.

There is one further point—the LRAS curve is located at the full-employment output level (y_{FE}). The implication is profound—in long-run equilibrium, the economy achieves full employment. In other words, there is a natural long-run pressure for the economy to operate at full employment. Harking back to Chapter 1 (Volume I), the economy will be operating at a point on its production possibility frontier in the long run—the assumptions behind the Law of Comparative Advantage are justified.

Factors That Can Shift the Long-Run Aggregate Supply Curve

There is a strong conceptual link between the LRAS curve and the production possibility frontier, and the factors that can shift the LRAS curve are the same ones that can shift the production possibility frontier—improvements in the quantity or quality of resources and improved technology.

Improvements in the Quantity of Resources: By reference to Figure 5.4, if the supply of labor increases, through higher participation rates or immigration, then the supply of labor curve will shift to the right, increasing the equilibrium number of hours worked and, therefore, increasing full-employment real GDP from y_{FE_0} to y_{FE_1}. The LRAS curve will shift to the right as shown in Figure 5.6.

Improvements in the Quality of Resources or Technology: The demand for labor is determined by the amount of output that workers can produce—if workers achieve greater productivity then there is a greater demand for their services. Given the same quantity of labor, an improvement in the quality of labor (or an increase in the resources it has available to it) or an improvement in technology will increase the demand for labor and, subsequently, an increase in the equilibrium quantity of labor hired. Full-employment real GDP will increase and the LRAS curve will shift to the right.

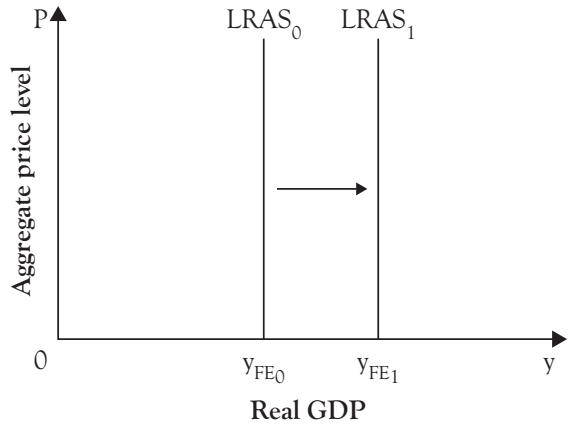

Figure 5.6 An increase in long-run aggregate supply

The Short-Run Aggregate Supply Curve

The Slope of the Short-Run Aggregate Supply Curve: In general, there is a positive short-run relationship between aggregate output and the aggregate price level. Higher prices induce greater production. There are several explanations for this relationship in the economics literature but the common theme is that, when the aggregate price level changes, individuals are slow to adjust fully and, therefore, the expected price level is at variance with the actual price level. Basically, people miscalculate. Following are three explanations for the upward-sloping SRAS curve.

The Sticky-Wage Theory: Firms are in business to earn profits. Given an increase in aggregate demand, the demand for the typical firm's specific product will increase and, if its resource costs do not respond as rapidly to rising prices—if its resource costs are "sticky," in other words—then the firm can increase its profits by raising its price and increasing production. If higher wage claims lag behind the firm's ability to raise its prices, then it is in the firm's best interests to increase production.

This is a short-run situation—workers will not make the same mistake permanently. In the long run, by definition, wages and other resource costs will adjust fully to the increasing prices, removing the incentive to maintain the higher level of production.

THINK IT THROUGH: Can you work through how this process leads to a decline in output when the aggregate price level decreases?

The Producer Misperceptions Theory: This explanation for the positive SRAS curve relationship begins from the assumption that producers derive information about changes in the overall price level through what happens in their own market. Each individual market is buffeted by changing conditions, some being general in nature, but many being exclusive to itself. For any given price change, the entrepreneur assumes that it has market-specific causes. A genuine increase in the aggregate price level, therefore, is interpreted as an increase in price only in their particular market and other markets are assumed not to have experienced a similar price change. Accordingly, producers believe that the price of their product has increased relative to prices of other goods. This is the misperception—the relative prices have not changed.

An increased relative price is taken as a market signal to increase production. Across all industries, firms increase production in the mistaken belief that the reward for producing their particular product has risen. Over time, as more evidence is gained, the misperception will be recognized and output will return to its original, full-employment level.

The Worker Misperception Theory: This theory argues that workers are slower than are employers to realize that the overall price level has increased. Initially, in Figure 5.4, the market is in equilibrium at a real wage of 6, with the nominal wage having a value of $12 per hour and the aggregate price level at $2. Following an increase in the aggregate price level to $3, employers generously raise the nominal wage to $18 per hour to keep pace with rising prices meaning the real wage is unchanged. Workers, however, are unaware that the aggregate price level has risen and, believing it to be $2, think that their real wage has increased to 9. This is the misperception and, because a rising real wage encourages an increase in the quantity of labor supplied, more resources flow toward production and, consequently, output increases. As time passes, workers realize their mistake and the long-run equilibrium is restored.

The Slope of the Short-Run Aggregate Supply Curve Refined

The SRAS curve is generally upward-sloping but, as shown in Figure 5.7, it becomes horizontal at low levels of production and vertical at high levels of production.

At very low levels of economic activity, such as occurred during the Great Depression, firms will have much excess capacity—including underemployed

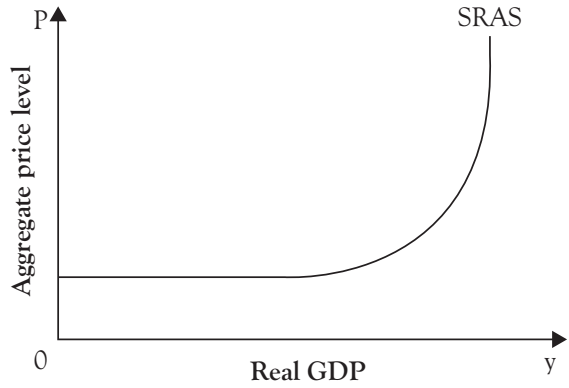

Figure 5.7 The short-run aggregate supply curve

workers—and, outside the factory gates, will stand many unemployed workers desperate for a job. In such an environment, an increase in the demand for output may be met without much (or any) increase in average cost of production and, therefore, with minimal upward pressure on price.

At the other extreme, the SRAS curve must become vertical— regardless of the aggregate price level, there must be some maximum level of output that cannot be surpassed. Having attained that output level, any additional increase in the aggregate price level will not have any impact on real GDP.

The Relationship between the Long-Run and the Short-Run Aggregate Supply Curves

Comparing Figures 5.5 and 5.7, we know that the LRAS curve is vertical and the SRAS curve becomes vertical. It is tempting to conclude that the SRAS curve converges with the LRAS curve. This is wrong, however. The correct relationship between the two curves is displayed in Figure 5.8.

The LRAS curve is located at the output level at which the economy has full employment. The SRAS curve protrudes beyond the LRAS curve because it is possible, at least in the short run, to achieve rates of resource usage greater than what can be sustained in the long run—we can sprint at a faster rate for a brief interval than we can maintain over the long haul.

A Simplified Diagram: From now on, we will draw the SRAS curve as a simple upward-sloping line, as shown in Figure 5.9, ignoring the horizontal and vertical extremes.

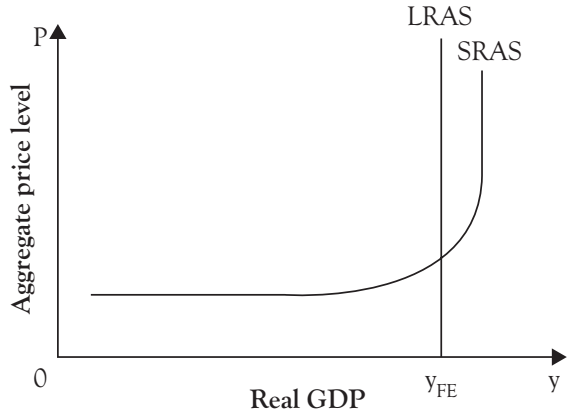

Figure 5.8 The relationship between the LRAS curve and the SRAS curve

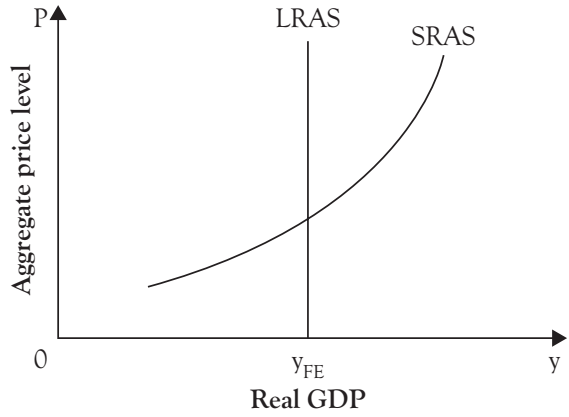

Figure 5.9 The simplified relationship between the LRAS curve and the SRAS curve

Factors That Can Shift the Short-Run Aggregate Supply Curve

In addition to the factors that can shift aggregate supply in the long run—changes in technology and in the quantity and quality of resources— numerous other factors can influence the economy's short-run ability to produce. Changes in factors such as resource costs, taxes and the amount of regulation imposed on producers, temporary changes in productivity, and expectations about inflation will all have only a short-run influence on aggregate supply, as will temporary supply-side shocks such as strikes, weather conditions, terrorist attacks, and trade embargos.

Looking at the list of factors, increases in resource costs such as wages or the price of imported oil due to a depreciation in the value of the domestic currency, additional excise, sales, or payroll taxes, or more stringent regulation will all conspire to increase the per-unit cost of production, causing the SRAS curve to shift to the left. Productivity improvements will have the opposite effect, reducing per-unit costs, and driving the SRAS curve to the right as shown in Figure 5.10.

THINK IT THROUGH: "Wait," you may object, "this list considers factors that have only a short-run influence but, surely, a productivity improvement affects the LRAS curve too!"

Quite correct! Healthier, better-educated workers, with more efficient machines, are permanently more productive—and both the SRAS curve and

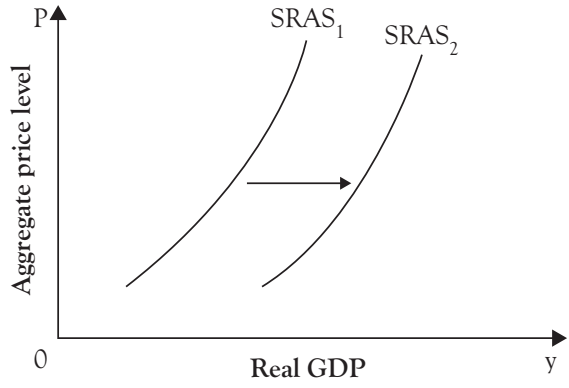

Figure 5.10 An increase in short-run aggregate supply

the LRAS curves will shift to the right. However, in some circumstances, productivity may increase or decrease temporarily. Evidence shows strongly that productivity increases during recessions, for example, as workers, concerned about holding onto their jobs, put in a bit more effort. This is a temporary phenomenon—once normality returns, workers ease off once more.

Expectations about Inflation: We have concluded that changes in resource costs affect the position of the SRAS curve. But, one step back, expectations about inflation influence resource costs. If workers expect the inflation rate to be zero, then they ought to be content with their current wage settlement. However, if they believe the inflation rate will rise to 7 percent, then (even though this belief is mistaken!) they will feel justified in asking for a wage hike of 7 percent that will increase per-unit costs, decrease profits, and push the SRAS curve to the left. Similarly, if employers' expectations regarding future prices change, for example, a new expectation of rising prices, then firms will anticipate higher wage claims and rising costs, and, in response, they will decrease output at any given price level—the SRAS curve will shift to the left. On the other hand, if there is a downward adjustment in expected inflation rates, then the SRAS curve will shift to the right.

Macroeconomic Equilibrium: Balance in the Short Run

Reaching Short-Run Equilibrium

In this section, we examine how the macroeconomy achieves short-run equilibrium. Considering Figure 5.11, we have done enough economics

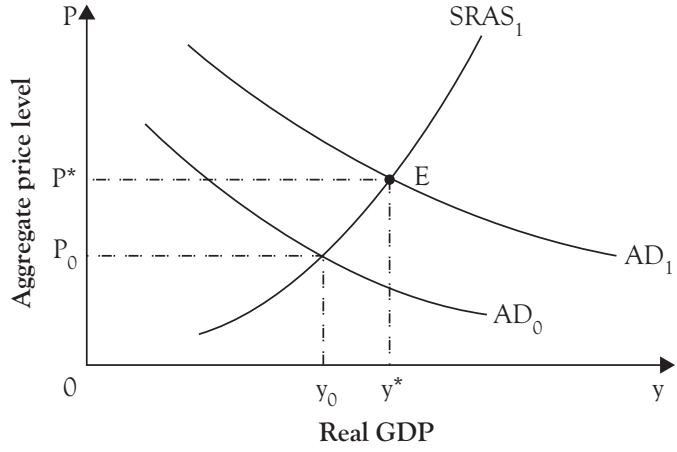

Figure 5.11 Short-run equilibrium

by this point to realize that initial equilibrium occurs where the two curves, AD_1 and $SRAS_1$, intersect, at an aggregate price level of P* and an output level of y*. However, it is worthwhile to trace through the process by which the economy achieves that equilibrium.

To analyze the equilibrating process, let us suppose that the AD curve initially is at AD_0, and that the equilibrium price and output are P_0 and y_0, respectively. Now aggregate demand increases from AD_0 to AD_1. Can you think of a reason for such a shift? If not, refer back to the section on factors that can shift aggregate demand.

At the initial aggregate price level, P_0, the quantity of goods and services supplied (y_0) now is less than the quantity demanded. Inventories are falling below firms' desired levels as firms scramble to meet the unexpectedly high demand. The depletion of inventories is a signal for firms to increase their prices and to hire more workers and increase production. As the aggregate price level rises and wages and other resource costs lag behind, the economy's output level increases. At the same time, as the aggregate price level increases, the wealth, real interest rate, and foreign trade effects are felt by consumers and firms, and there is a decline in the quantity of aggregate output demanded. (Shown as a movement along the AD curve.)

As long as there is a mismatch between quantity demanded and quantity supplied in the economy, there will be an ongoing process to achieve equilibrium. That (short-run) equilibrium is reached at point E.

THINK IT THROUGH: Note that the short-run equilibrium output level, y^*, need not be the full-employment output level (y_{FE}). In our example, we have *two* short-run equilibria, at y_0 and y^*. Clearly, even if one of these were the output level at which full employment occurs, then the other equilibrium could not be, so, in general, we cannot assume that, in the short run, the economy will achieve full employment.

The Self-Correcting Mechanism: Harmony in the Long Run

At this point, you may feel that there is an inconsistency in economics. On the one hand, we have just concluded that there is no guarantee that the economy will be at the full-employment output level in the short run but, on the other hand, we asserted earlier that the economy will operate on the LRAS curve, which is located precisely at that output level. In this section, we resolve this puzzle.

The economy has inherent forces that inexorably move it toward the output level at which full employment is achieved—there is a **self-correcting mechanism** within the economy.

The Long-Run Behavior of the Short-Run Aggregate Supply Curve

As a starting point, let us reconsider the "simplified" relationship between the LRAS curve and the SRAS curve as shown in Figure 5.12.

The LRAS curve is positioned at the output level at which the economy has full employment (y_{FE}). At this output level, some frictional and structural unemployment is present as a normal condition of a well-tuned economy, but no cyclical unemployment exists.

Compared with the LRAS curve, the SRAS curve has three regions—where output exceeds y_{FE}, as typified by point A; where output falls short of y_{FE}, as typified by point B; and point E, where the SRAS curve intersects the LRAS curve and output equals y_{FE}. Let us discuss the economic conditions prevailing in each of these circumstances and their implications for the SRAS curve.

At point A, current output is greater than the level that can be sustained in the long run. The unemployment rate has been pushed lower than the

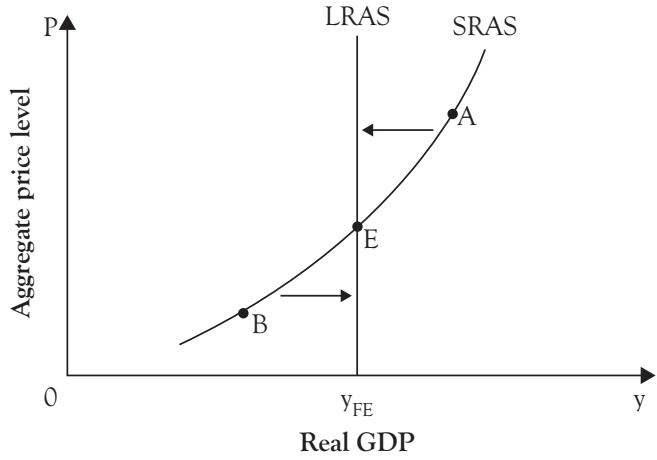

Figure 5.12 The interaction between the SRAS curve and the LRAS curve

natural rate of unemployment. Inventory levels are minimal, labor markets are tight, fresh resources are hard to find, and breakdowns and bottlenecks in production and distribution are disrupting the ability of firms to coordinate their activities effectively. If you will, the economic machine is overheating.

As a consequence, production costs will rise. Bottlenecks and delays reduce productivity. Firms, wishing to hire workers, but with unemployed workers thin on the ground, must headhunt employees from other firms by offering them more attractive wages and benefits. Increasing resource costs and declining productivity are among the factors that shift the SRAS curve to the left; therefore, as time passes, we would expect to see the SRAS curve shift to the left.

Conclusion: Any time the economy is in a situation like point A, we would expect the underlying economic pressures to shift the SRAS curve to the left over time.

At point B, the opposite environment exists. Production level is low and the unemployment rate exceeds the natural rate of unemployment. Unsold production is piling up in warehouses. Cyclically unemployed workers, desperate for a job, may be willing to accept lower wages and reduced benefits. Other resources, sitting idle or underused, may become cheaper to acquire. In such a situation, productivity tends to increase, as workers who still have a job strive to avoid layoffs. Declining resource costs and increasing productivity will push the SRAS curve to the right.

Conclusion: If the economy is in a situation similar to point B, then we would expect the underlying economic pressures to shift the SRAS curve to the right over time.

At point E, the economy is neither overstressed nor underutilized. Labor and other resource markets are operating efficiently and sustainably, and firms have achieved their optimal inventory levels. There is no compelling pressure for change—the economy is at long-run equilibrium.

Conclusion: Long-run equilibrium occurs at the aggregate price level where the SRAS curve and the LRAS curve intercept.

The Self-Correcting Mechanism

Let us suppose that the economy is initially at point E_0 as shown in Figure 5.13.

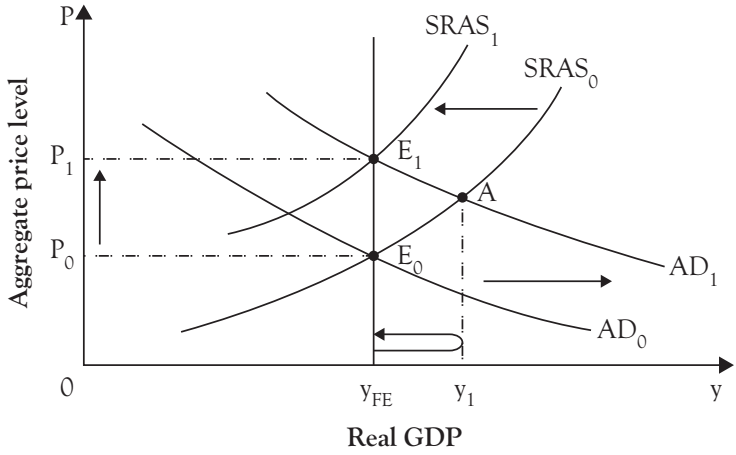

Figure 5.13 The self-correcting mechanism

The aggregate demand curve is AD_0, the short-run aggregate supply curve is $SRAS_0$, and the long-run aggregate supply curve is LRAS. The economy is in short-run and long-run equilibrium at point E_0.

Now, perhaps because of increasing consumer and business confidence, aggregate demand shifts to AD_1. At the initial price level, P_0, there will be a mismatch between aggregate demand and short-run aggregate supply, with declining inventories and swelling waiting lists for orders. The aggregate price level will start to increase. Following the short-run equilibrating process described in the previous section, the economy will achieve a new short-run

equilibrium at point A. At this point, the economy is producing at an output level, y_1, that exceeds the sustainable full-employment output level, y_{FE}, and, based on our earlier conclusions, we would expect to see the SRAS curve start to move to the left because of the economic pressures imposed. This move must continue until the unsustainable stresses are alleviated—this will only take place when the economy once more reaches full employment (at point E_1). Here, with AD_1 and with the SRAS curve pushed by economic forces to its new location at $SRAS_1$, the economy simultaneously is in short-run and long-run equilibrium. Short-run and long-run equilibrium can only be achieved at the full-employment output level.

THINK IT THROUGH: Confirm that the SRAS curve must keep moving left until it reaches $SRAS_1$ because, until that position is reached, a "point A" situation is still obtained.

We have established that, in the long run, the economy will "self-correct" back to the full-employment output level if, in the short run, it is pushed beyond that level.

Although we assumed that an increase in aggregate demand has initiated the process, it could just as readily been triggered by a short-run increase in supply, perhaps caused by an exceptionally good harvest or reduced business taxes. How, then, would the economy restore long-run equilibrium? By exactly the same process! The self-correcting mechanism always and only operates through a counterbalancing shift in the short-run aggregate supply curve.

THINK IT THROUGH: It is tempting to believe that, if an increase in aggregate demand is "balanced" by a decrease in short-run aggregate supply, then an increase in short-run aggregate supply ought to be "balanced" by a decrease in aggregate demand. Tempting, but false! Again, the self-correcting mechanism *always and only* operates through a counterbalancing shift in the SRAS curve.

Let us now suppose that the economy is again initially at point E_0, as shown in Figure 5.14.

Once more, the initial aggregate demand curve is AD_0, the initial short-run aggregate supply curve is $SRAS_0$, and the long-run aggregate supply curve is LRAS. The economy is in short-run and long-run equilibrium at

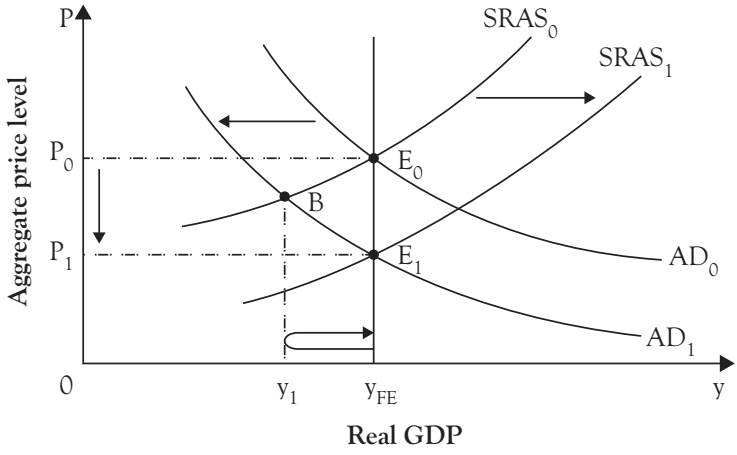

Figure 5.14 The self-correcting mechanism again

point E_0. In this example, aggregate demand decreases to AD_1, perhaps due to a recession in Europe that has caused a decrease in our exports, or an increase in real interest rates that has deterred investment and consumption. Short-run equilibrium will occur at point B. Output will be at y_1, an output level at which many workers are unemployed.

Our earlier analysis of a "point B" situation indicates that the SRAS curve will shift to the right, as anxious employees increase productivity and unemployed workers bargain down labor costs. Long-run equilibrium will be restored, at point E_1, only when the SRAS curve has moved to $SRAS_1$.

A similar situation would occur if the initial "shock" affected the SRAS curve, shifting it to the left. The OPEC oil-price hike of the 1970s shifted the SRAS curve dramatically to the left, causing **stagflation** between 1973 and 1975. In 1979, a second oil-price shock had a similar effect, spawning double-digit inflation rates. In both episodes, draconian measures were implemented to combat the inflation—the Nixon Administration imposed wage and price controls and the Reagan Administration engineered a credit crunch and high unemployment (over 10 percent) to squeeze the inflationary pressures out of the economy. The self-correcting mechanism indicates that, left to its own means, the economy would have restored long-run balance without such policies, by pushing the SRAS curve back to the right.

It is worth reiterating: The self-correcting mechanism *always and only* operates through a counterbalancing shift in the SRAS curve.

An Asymmetrical Process

On paper, the self-correcting mechanism looks deceptively simple and even-handed—like a large inflatable Bobo doll, it seems that, if pushed in one direction, it will automatically rock back in the other direction until balance is reestablished.

Although there is significant consensus among economists about the *existence* of the self-correcting mechanism, there is much debate regarding the speed and symmetry of its operation. We may be quite willing to raise wages and prices in response to a booming economy and burgeoning demand, but a process that relies on workers to increase productivity or to accept wage cuts to alleviate widespread unemployment may take a long time to be effective. In the former case, the mechanism may be relatively strong and rapid but, in the latter circumstance, it is likely to be weak and slow—in theory, the two sides of the adjustment mechanism may look equivalent, but in practice, not so.

Further, the closer the economy approaches full employment, the weaker the forces propelling it become. Cyclical unemployment may linger, impacting millions of households, for months or years, as the economy drifts toward long-run equilibrium.

There are two responses to this conclusion—either adopt practices that strengthen the self-correcting process or initiate corrective stabilization policies to compensate for its inadequacies. In particular, if the process of pulling out of a recession is weak, then there may be scope for government intervention to act as a stimulus.

Differing Perspectives: The Long Run versus the Short Run

The proof of the pudding, they say, is in the eating. Similarly, our economic model's implications are subject to differing interpretations and evaluation.

For instance, if we believe that markets, left to themselves, adjust swiftly and effectively to remove imbalances, then we ought to support the view that the self-correcting mechanism will rapidly propel the economy to full-employment equilibrium—the long run arrives quickly. If, on inspection, we discover that the self-correcting mechanism is nonetheless weak, then we must find reasons for this—perhaps government rules

that restrict market forces and competition, or well-intentioned government meddling that distorts the competitive price signaling system.

On the one hand, given our belief in well-tempered and responsive privately run markets and a smooth transition from one long-run equilibrium to the next, the need for government intervention must seem unnecessary and even counterproductive. We would lean heavily toward smaller governments and less intrusive policies.

On the other hand, if we believe that markets, left to themselves, are sluggish and that they respond lethargically to imbalances, and that the self-correcting mechanism is virtually impotent, then we ought to support the view that the economy could, for example, wallow in a recession for months or years unless an outside force, such as the government, intervenes to fix things. The existence of the self-correcting mechanism is not in dispute, merely its efficacy and whether or not we should rely on it.

There is an ongoing tension in macroeconomics between those who favor focusing on long-run objectives and those who believe that short-run concerns must be addressed. There is no simple solution. Clearly, there would seem to be a political dimension to this issue but analysis on that point is left to the reader.

"In the Long Run We Are All Dead"

This famous statement by John Maynard Keynes, admitting the existence of the long run but denying its relevance, exposes the contrast between "Keynesian" economists, who favor short-run demand-side interventionist policies to stabilize the economy and "Classical" economists, who favor the long-run view and policies that support and enhance supply-side efficiency. In the following section, we explore the foundations of the two views.

The Demand-Side (Keynesian) versus Supply-Side (Classical) Debate

Let us consider the underlying beliefs of the two camps about the nature of the economy and their views on the causes and cures of the twin evils of macroeconomics—unemployment and inflation.

Classical Economics: Basic Principles and Conclusions

Classical economics has deep roots, stretching back at least as far as Adam Smith's *Wealth of Nations* (1776) and David Hume's essay *On Interest* (1748). Indeed, to talk of "the" Classical model is misleading because, over time, variants and outgrowths have occurred, sometimes sufficiently distinctive to warrant a new tag—Austrian, neoclassical, monetarist, and so on. However, the similarities in ideas are more enduring and significant than any differences and it is to these common themes that we turn now.

The Long Run Is the Focus of Attention

For the Classical economists, the long run is of prime importance. Of course, given their belief that the short run is a brief, transitory period, this is understandable. Their confidence in the power of the economy to achieve virtually automatic full employment colors their other conclusions.

Wages and Prices Are Flexible

In the Classical world, markets clear, and do so quickly. This includes the labor market, so involuntary unemployment ought to be short-lived. To the extent that it is not true that markets clear quickly, the impediments to flexibility—long-term contracts, powerful negotiating blocs, poor information—can be alleviated by adding competitive elements. If the labor market fails to clear because of the presence of a minimum wage, it is not the market that has failed, but the restrictive regulation imposed on it. In a sense, this Classical postulate is true—in the long run, as we have seen, markets do clear.

"Supply Creates Its Own Demand"

This is a brief statement of **Say's Law of Markets**. Note the preeminence of the supply side! French economist Jean-Baptiste Say argued that the act of producing goods and services generates enough income for households (within which the productive resources reside) to be able to purchase all of that output. In other words, the production process creates exactly the

spending power needed to buy the nation's output. If, for some reason, this is not so, then prices will adjust. If there is an overabundance of goods (a very good harvest), then prices will decrease to ensure that all goods are bought. According to Say's Law, aggregate supply and aggregate demand will be equal and, given full employment in the labor market, that equality will be at the full-employment output level.

THINK IT THROUGH: "But what if, instead of spending their income, households choose to save some of their money?" Again, the Classical perspective is long run—short-run fluctuations in consumption and saving are irrelevant. In addition, if saving flows into the loanable funds market, then it will be channeled to borrowers who will spend with no loss of overall spending power. We consider the loanable funds market later in this section.

The Economy Is Self-Correcting

This is directly contradictory to Keynes' view that the economy could become stuck in a situation like the Great Depression. Today, this previously discredited view can be found repeated in introductory texts—the economy does have a self-correcting mechanism that eliminates cyclical unemployment through the application of market forces. As referred to earlier, the remaining bone of contention is how rapidly the process operates.

"Money Is a Veil"

In Chapter 4 (Volume I), we discussed the Quantity Theory of Money ($M \times V = P \times y$), which states that the money supply (M) will circulate at a velocity (V) sufficient to purchase the value of nominal GDP ($P \times y$). Changes in the money supply will have no impact on real wages, real GDP, the level of employment, or any other real variable in the economy and, in that sense, money is said to be *neutral*. However, "money matters" with respect to inflation because, if the money supply were to be doubled then, after the dust had settled (in the long run!) there would be a doubling in the aggregate price level. For the Classical economists, a tight

grip on the government's ability to print money is the key to controlling inflation.

Policy Views

With unemployment a temporary, self-correcting problem and price stability under the control of the financial authorities, there is no place in the Classical world for demand-side policies. Prosperity springs from the economy's self-interested supply-side ability to develop new resources and to find better ways of using existing ones. Short-run fiscal and monetary policies, at best, are futile; at worst, are disruptive.

THINK IT THROUGH: The LRAS curve is the centerpiece of Classical economics. With a vertical supply curve, no change in demand can have a permanent impact on output or employment.

If a monetary policy action boosts aggregate demand, then the consequence will be an increase in the aggregate price level but there will be no permanent benefit in terms of production or employment. Further, by jolting financial markets, such policies may reduce the effectiveness of private sector investment decisions and stunt future growth. Accordingly, the Classical opinion of monetary policy is that the money supply should grow at a steady pace that would ensure stable prices, that policy changes for short-run advantage should be avoided, and that policies should be clearly announced in order to facilitate sensible private sector choices.

The effects of fiscal policy are more complex and require us to consider the loanable funds market and the crowding-out effect in some detail.

The Loanable Funds Market and the Crowding-Out Effect There is a market for "loanable funds." In the final analysis, the supply of loanable funds flows from household saving and because, as the real interest rate increases the reward for saving, the supply of loanable funds curve (S) is upward-sloping, as shown in Figure 5.15.

Businesses demand loanable funds for investment purposes. The government, to the extent that it must borrow to finance a deficit, is also part of the demand for loanable funds but let us suppose that, initially, the government has balanced its budget and, therefore, the demand for loanable funds derives

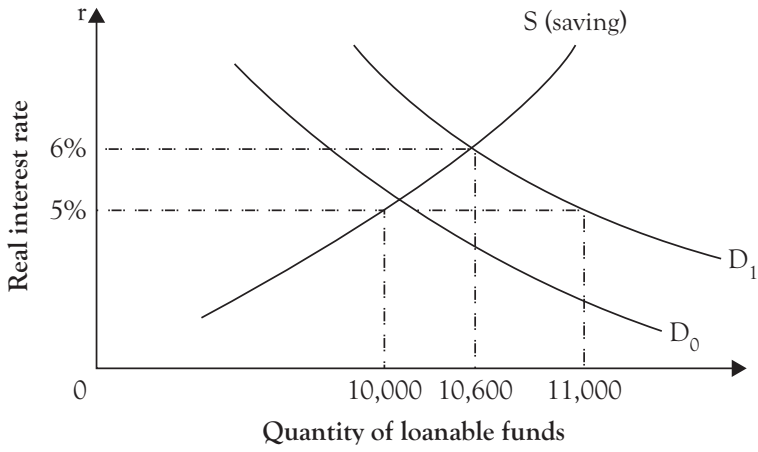

Figure 5.15 The loanable funds market

purely from the private business sector. The higher the interest rate, the more expensive it is to borrow, and the fewer profitable investment opportunities there will be—the demand for loanable funds curve (D) is negatively sloped.

Market forces establish a market-clearing interest rate (5 percent) and a quantity of funds ($10,000) is exchanged. The "leakage" of spending power represented by saving has been compensated for by the "injection" of spending power represented by investment, supporting the conclusions of Say's Law.

Let us now suppose that there is an increase in government spending of $1,000, intended to boost aggregate demand and to stimulate the economy. Whereas previously the government had balanced its budget, it now has a deficit of $1,000. If the spending is financed by printing money, then its actions will be inflationary. If, however, borrowing finances the deficit, then the demand for loanable funds will increase by $1,000 from D_0 to D_1, causing the interest rate to increase to 6 percent and the equilibrium quantity of funds exchanged to increase to $10,600.

Because the government is borrowing $1,000, borrowing for private investment purposes has fallen by $400 to $9,600—government spending has "crowded out" investment. This is not the end of the story because the interest rate increase encourages saving to increase, from $10,000 to $10,600. Given income, if households are saving $600 more, then they must be consuming $600 less—government spending has crowded out consumption. Because one component of aggregate

demand has increased by $1,000, but two other elements (investment and consumption) have decreased together by $1,000, the policy has no effect on the level of aggregate demand. An expansionary fiscal policy, financed by borrowing, will increase the size of the government sector, swell the deficit, increase interest rates, shrink the size of the private sector, and, because of the reduction in investment spending, jeopardize future growth.

The Classical view is that fiscal policy is impotent and, therefore, that government intervention should be limited, with the goal of achieving a balanced budget.

Keynesian Economics: Basic Principles and Conclusions

In the introduction to his *General Theory*, Keynes stated that "the postulates of the Classical theory are applicable to a special case only" and that those characteristics were not applicable to modern economic society. The following statements present the Keynesian position. Keep in mind that, for the Keynesians, the LRAS curve is a far-distant and continually receding rainbow's end, never to be reached.

The Short Run Is the Focus of Attention

For Keynes and his followers, the Classical theory's "long run" is an abstraction and its "wait and see" prescription untenable, having little to do with practical policy concerns. Certainly, the misery witnessed during the Great Depression seemed to brook no delay. Harry Hopkins, Franklin D. Roosevelt's welfare chief, remarked that "People don't eat in the long run—they eat every day."

THINK IT THROUGH: Keynes, writing during the depths of the Great Depression, was reacting to an economic theory that claimed that protracted involuntary unemployment was not possible and that the economy would quickly self-correct. Keynes could see no evidence to support such beliefs and branded Classical economists "a gang of incompetent bunglers."

Wages and Prices Are Sticky

The Keynesians argue that long-term labor contracts, powerful negotiating blocs (unions and powerful industrialists), lack of information, and regulations conspire to make wages and prices "sticky" and, because of this stickiness, resource markets fail to clear as predicted by the Classical model. Certainly, even during the Great Depression, there was a strong institutional reluctance to accept wage cuts, changes in wage differentials, or redefinition of job responsibilities.

"Demand Creates Its Own Supply"

We might think of this statement as "Keynes' Law" to draw the contrast with Say's Law. In opposition to the view of the Classical school, the Keynesians believe that the economy is demand driven. The act of spending income and demanding goods and services will stimulate production and employment—will stimulate supply.

The Economy Can Get Stuck in a Recession

This assertion is directly contradictory to the Classical view that the economy self-corrects. It is important to understand that *both* positions are correct. Keynes' analysis is justified in the short run whereas the Classical analysis is correct in the long run. If there are sticky wages and prices, then the self-correcting mechanism can falter and the economy might languish for years in a recession.

Money Is Not Neutral

In common with the Classical economists, the Keynesians believe that money supply changes do impact on aggregate demand but, unlike them, the Keynesian emphasis on short-run matters leads them to the conclusion that changes in aggregate demand due to monetary policy actions *do* affect short-run production and employment.

Keynes and the Multiplier

The concept of the **expenditure multiplier** (m) is perhaps the single most distinctive aspect incorporated by Keynes into *The General Theory*. Fortunately, it is quite intuitive.

THINK IT THROUGH: Having received good news and feeling more optimistic than usual, you suddenly choose to increase your spending by $1,000. By how much will the economy's equilibrium income level change as a result?

As with much in economics, the answer is "It depends!" In this case, it depends on the size of the expenditure multiplier.

There is a positive relationship between income and consumption—higher income, more spending. According to Keynes, as the income received by households changes, consumption also changes, although not by as much. If we receive an increase in salary, then we will spend most of it but we will save some of it. The *marginal propensity to consume* (MPC) is the fraction of any additional income that is consumed and the *marginal propensity to save* (MPS) is the fraction of any additional income that is saved. Ignoring taxes at the moment, if our salary increases by $1,000, and we spend $900 and save $100, then MPC is 0.9 and MPS is 0.1. Together, MPC and MPS must sum to 1.0—all extra income received must be either spent or saved.

$$\text{MPC} + \text{MPS} = 1.0$$

Table 5.1 shows the multiplier process in an economy in which MPC is 0.9 and MPS is 0.1. The process begins with Round 1, when Andrew suddenly increases his investment expenditures by $1,000 and buys a new computer for his firm from Brenda's Bytes. Any element of

Table 5.1 The multiplier process

Round	New expenditure	=	New income	=	New consumption	+	New saving
Round 1	$1,000.00	=	$1,000.00	=	$900.00	+	$100.00
Round 2	$900.00	=	$900.00	=	$810.00	+	$90.00
Round 3	$810.00	=	$810.00	=	$729.00	+	$81.00
Round 4	$729.00	=	$729.00	=	$656.10	+	$72.90
Round 5	$656.10	=	$656.10	=	$590.49	+	$65.61
.	.	.	.	.	.	.	.
Total	$10,000.00	=	$10,000.00	=	$9,000.00	+	$1,000.00

expenditures—consumption, investment, government purchases, or net exports—could initiate the process, but we will assume that it is investment.

The new spending creates $1,000 of extra income for Brenda. With an MPC of 0.9 and an MPS of 0.1, she decides to spend $900 and save $100. In Round 2, Brenda spends $900 on a new carpet for her home that she buys at Colleen's Carpet Closet. Colleen's income now rises by $900 and she decides to save 10 percent ($90) and spend 90 percent ($810). In Round 3, Colleen spends $810 on clothes at Della's Boutique, causing Della's income to rise by $810. Della will save 10 percent ($81) and, in Round 4, spend 90 percent ($729), and so the process continues, each time with progressively more of the initial injection of spending power leaking into saving. It ends only when all of the initial $1,000 spent by Andrew has been transferred to saving.

At the end of the process, the initial $1,000 injection of spending power has been multiplied into a $10,000 increase in income—a 10-fold increase. In this example, the value of the expenditure multiplier is 10. There has been an initial (autonomous) increase in spending of $1,000, and a subsequent increase in spending of $9,000, induced by the increases in income.

The multiplier's strength depends on how rapidly the injection of extra spending leaks away into saving or, put differently, how long the "earning/spending" process endures. If, for example, Brenda had saved all of the extra $1,000 she received, then the process would have stopped dead and no additional income would have been generated. The larger is the MPS (and the smaller the MPC), the more quickly the process subsides, and the smaller is the expenditure multiplier. In fact, in this simplest version, the formula for the expenditure multiplier (m) is

$$m = 1/MPS$$

We can use the circular flow diagram to help us to visualize how the "earnings/spending" process affects the size of the expenditure multiplier, as shown in Figure 5.16.

As income is generated and transferred from the business sector to the household sector, some portion of the additional income leaks away as saving, but the remainder is used for consumption spending, generating even more income. As we can see, the larger the leakage into saving (that

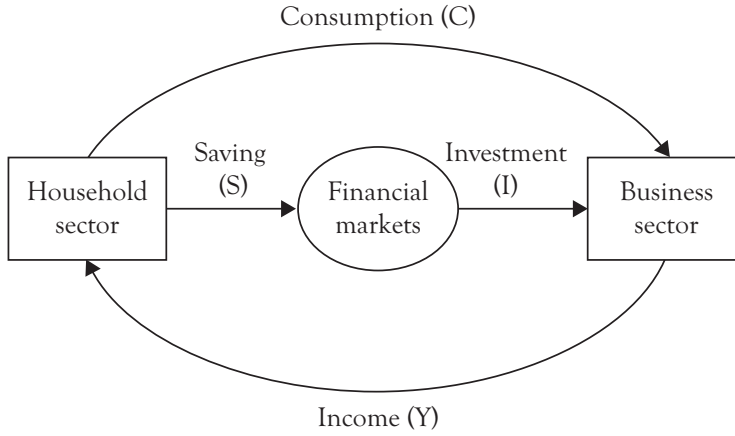

Figure 5.16 The circular flow diagram and the expenditure multiplier

is, the greater the MPS) the more quickly the process will come to an end and equilibrium will be achieved.

Comment: Saving is simply nonconsumption so households may choose to keep their unspent funds under the mattress but, as shown in Figure 5.16, we will assume that saving is funneled to the financial sector.

THINK IT THROUGH: If saving is merely nonconsumption, then how can additional investment possibly take place? Keep in mind that if households cut back in consumption, choosing to save more, then firms will experience rising inventory levels—and inventory accumulation counts as part of investment. No financial market involvement is required.

The expenditure multiplier resides at the heart of the Keynesian demand-driven model. If, for example, the multiplier's value is 10, this means that a relatively small initial change in government spending could trigger a large change in aggregate demand and have a significant impact on economic activity. Similarly, tax or monetary policy actions designed to influence consumption or investment spending would have substantial effects. The larger is the multiplier the more potent is the policy.

This raises a further issue. A sudden (autonomous) change in *any* element of aggregate demand (consumption, investment, government spending, or net exports) will provoke the multiplier effect—its influence is not restricted to the province of the policy makers.

If the expenditure multiplier's value is 10, and there is an autonomous change in expenditure (ΔE_A) of 100, then the overall change in equilibrium real GDP (income) will be 1,000.

$$100 \times 10 = 1{,}000$$

In general,

$$\Delta E_A \times m = \Delta y$$

Think again about movements in the position of the AD curve. If, for example, investment spending increases autonomously by 100, perhaps because of "animal spirits," then the AD curve will shift to the right by 100 to AD_0'. But that is not the end of the story—the multiplier process will generate additional spending (and income) beyond the initial 100. If the expenditure multiplier is 10, then spending will be induced to increase by an additional 900 to AD_1. The overall increase in the aggregate demand curve can be decomposed into two aspects—the autonomous change (100) and the induced change (900) as shown in Figure 5.17.

How large is the expenditure multiplier? Having an accurate answer is an important issue for policy makers. In our economy, the personal saving rate is very low—perhaps 5 percent at most. Based on this, we might expect the value of the expenditure multiplier to be 1/0.05, or about 20. In fact, the multiplier's value for the American economy is estimated to be about 2. Clearly, our model is lacking some important details!

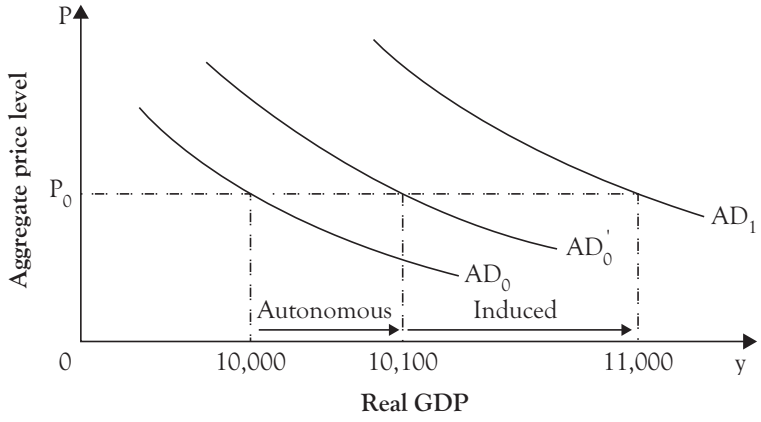

Figure 5.17 Autonomous and induced components of a shift in the AD curve

One aspect of this shortcoming is that businesses and governments also save. National saving is the sum of private saving by households and businesses and public saving by the government. Unfortunately, although business saving (in the form of undistributed corporate profits, for instance) is usually positive, public saving is almost always negative because of government deficits. Currently, gross saving is about 15 percent of the value of national income and, arguably, the MPS is somewhat higher.

The multiplier is weakened by any leakage that reduces the strength of the flow of funds from income to spending. National saving is one such leakage but there are others—income taxes, for example, or funds flowing out of the country to buy imported goods. Accordingly, the formula might be better thought of as

$$m = 1/\text{Marginal Propensity to Leak}$$

where "leakage" includes any reduction in the earnings/spending flow. Therefore, let us refer to the multiplier whose formula is 1/MPS as the "simplified" expenditure multiplier, recognizing that additional real-world leakages will reduce its size.

THINK IT THROUGH: A $100 increase in your salary is unlikely to translate into a $100 increase in your spending. Higher taxes and other deductions will reduce the amount. The greater the leakages are—voluntary or involuntary—the smaller the marginal propensity to spend.

There is a second, related but distinct, issue to consider—the size of the effect of an autonomous change in expenditures on equilibrium income. In this chapter, we have already met two factors that would diminish not the size of the multiplier per se, but the magnitude of its impact on equilibrium income. The crowding-out effect is one, and another is the operation of prices—the price dampener.

The Price Dampener: In *The General Theory*, Keynes assumed that prices were constant. In terms of Figure 5.7, Keynes assumed that the economy was operating on the horizontal portion of the SRAS curve—a fair assumption during the Great Depression but hardly the typical case. Usually, as aggregate demand increases in response to an increase in spending, the aggregate price level increases and, because

of the wealth, real interest rate, and foreign trade effects, the aggregate quantity of final goods and services demanded is reduced. As can be seen in Figure 5.18, for a given shift in the AD curve (in each case from AD_0 to AD_1), the steeper the SRAS curve and the greater the increase in the aggregate price level, the smaller the impact of the autonomous spending increase on the equilibrium income level. Collectively, we will call the operation of these three effects the *price dampener*.

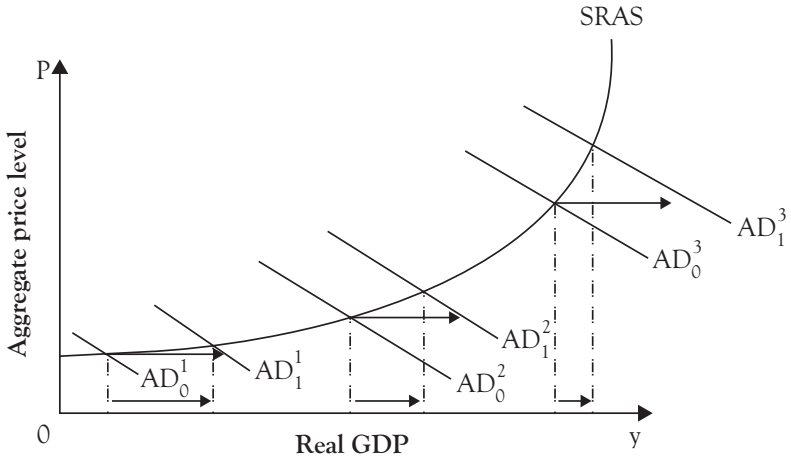

Figure 5.18 The slope of the SRAS curve and the strength of the multiplier

In addition, as shown in Figure 5.19, the flatter the AD curve, the weaker the impact of the autonomous spending increase. With strong wealth, real interest rate, and foreign trade effects causing the AD curve to be quite sensitive to changes in the aggregate price level, the less the equilibrium level of output will change for a given change in the position of the AD curve. If the economy's AD curve is similar in slope to AD^1 (comparatively flat), then the expansionary effect will be less significant than if it is similar to AD^2 (comparatively steep).

Finally, in the long run, because of the vertical LRAS curve, the price dampener reduces the impact of the expansion on equilibrium income level to zero!

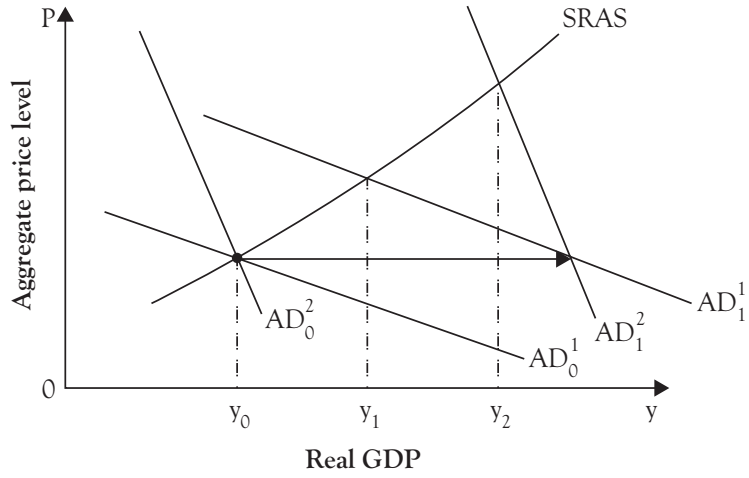

Figure 5.19 The slope of the AD curve and the strength of the multiplier

Policy Views

The policy views of the Keynesians have already been discussed but, in summary, they believe that short-run demand-side fiscal and monetary stabilization policies are effective and, given the weakness of the self-correcting mechanism, ought to be pursued.

Review: This has been a long and complex chapter. We have introduced the ADAS model and discussed some of its long-run and short-run implications. Following this, we have considered the Classical (supply-side) view and the Keynesian (demand-side) view of the workings of the economy and how it may be controlled. As we leave this chapter, it is important to realize that each position is valid within its own terms of reference and has the support of a great many economists and policy makers. Which position we favor, if either, reveals as much about our own preferences as it does about the economy itself.

CHAPTER 6

The Government Sector

Fiscal Policy and Short-Run Stabilization

By the end of this chapter, you will be able to.

- Describe the economic functions of government in a market economy.
- Define the federal deficit (surplus) and explain its relationship to the federal debt.
- Identify the tools of fiscal policy.
- Describe how the inclusion of the government sector affects the ADAS model.
- Explain how autonomous changes in government spending and net taxes affect output, unemployment, and inflation.
- Assess the effectiveness of fiscal policy actions and describe problems in the implementation of fiscal policy.
- Explain how the incorporation of tax rates will influence the expenditure multiplier.
- Explain the effects of automatic stabilizers on economic fluctuations.

If an opinion pollster were to ask you what you thought the proper role the government should be in the operation of the economy, then what would be your response? How far-reaching ought the government's control be? Clearly, the rival communist system of state-controlled production and distribution has largely withered away, with even China

embracing capitalism but, within capitalism itself, what is the appropriate position for the public sector?

Chapter Preview: The basic logic in this chapter is the same as that of Chapter 5, in the sense that we continue to use the ADAS model. The primary focus is short run. We begin by looking at the economic scope and functions of the government and then examine the tools it has at its command to conduct fiscal policy actions to achieve short-run stabilization of the economy.

In our model so far, we have assumed that net taxes are lump sum, that is, tax revenues don't change as the level of economic activity changes. However, in this chapter we will see that automatic stabilizers (such as the federal income tax system) do, in fact, alter with the level of economic activity and, in so doing, are yet another factor that reduces the size of the expenditure multiplier.

The Government Sector: Its Size and Functions

The Functions of Government

President Calvin Coolidge once famously stated, "the business of America is business" but, if pressed, most of us would admit that we need some degree of government intervention in the economy to facilitate the conduct of that business.

Legislative Function

At the very least, we need an organization to provide and enforce a stable set of rules for commerce. Among its functions, the government establishes a legal framework within which commercial and other transactions take place. At the most fundamental, as Adam Smith contended in *The Wealth of Nations*, *laissez-faire* capitalism thrives on self-interest and private property rights but, without laws and a legal system guaranteeing those rights, capitalism's power would be stunted. Even in a free-market economy, we need an organization to establish the rules of the game, to ensure that those rules are followed, and to sanction those who infringe them.

Arguably, a government need not stray beyond the legislative/judicial role. However, government has adopted other roles to foster a competitive

environment and to make up for defects in the private market system. These functions include regulation of anticompetitive forces, provision of public goods, control of externalities, correction of undesirable free-market consequences, and macroeconomic stabilization policy.

Regulatory Function

Capitalism operates best when feeling the spur of competition so, if a company grows powerful enough to control a market and operate against the interest of its customers or its competitors, then a case may be made for the regulation of that company in order to enhance competitive forces. This is a major message of Smith's *The Wealth of Nations*—because the "invisible hand" of competitive self-interest unintentionally directs *laissez-faire* markets to do what's best for society, liberalization of trade is beneficial. Large monopolistic entities, such as the East India Company, or the Hudson Bay Company (in Smith's day), cramped the strength of free enterprise and ought to be controlled.

Provision of Public Goods

Sometimes, markets fail to produce the correct mix of goods and services to meet the needs of society. *Public goods*, such as a lighthouse, are underprovided by the free market because a key characteristic of a public good is that, if it is provided to one user, then no other user can be excluded from its benefits. Clearly, there is a temptation on the part of would-be consumers to hold back until someone else buys and then receive the benefits "for free" but, if all customers follow this approach, then less than the socially optimal amount of the good will be produced because producers will receive insufficient revenue. This is known as the *free-rider problem*. Contrast this with a *private good* such as heart surgery, where the benefit is received only by the purchaser of the good. Those who do not buy can be excluded from the benefits—there is no free-rider problem with private goods. If you don't buy, you don't get.

In the case of public goods (lighthouses, national defense, the interstate system), the government provides the good to citizens and finances the outlay by imposing taxes—this method of compulsion is far distant

from private choice but it is seen as necessary to guarantee the socially optimal level of provision of these goods.

Control of Externalities

In the quest for profits, private firms frequently have exhibited the unfortunate tendency of ignoring the results of their actions on nonmarket participants who are present on neither the demand side nor the supply side of the market. An entrepreneur's self-interest may lead to her having few qualms about her factory's emissions causing acid rain in another state or country. In a *laissez-faire* world, if others suffer, then let it be. *Externalities*, costs or benefits imposed on third-party individuals by the production or consumption of a good, certainly do disrupt the ability of the free market as a whole to provide the most desirable mix of goods and services for society. If we believe that fracking, water or atmospheric pollution by factories, or mountaintop removal mining by coal companies imposes environmental costs on third parties, then we may feel justified in curtailing those commercial activities. Similarly, if driving after drinking, texting while driving, or tailpipe emissions are viewed as detrimental to society's well-being, then we may wish to impose restrictions on consumers who wish to indulge in these actions.

Correction of Undesirable Free-Market Consequences

Working properly, the free market may cause outcomes that often are considered socially undesirable. Should we, for instance, allow those who are very productive and talented to keep the full reward from their efforts? Although many would assent to the proposition, the issue becomes less clear if we reverse it: Is it socially desirable (or fair) that those with handicaps or few skills should be reduced to lifelong poverty because of an inability to earn or learn? Government has assumed the controversial role of redistributor of income and wealth. Our progressive income tax system, for instance, is crafted *with the intent* of taking dollars from high-income earners and transferring them to the poor, the hungry, the unhealthy, and the unproductive.

Consumer choice is a cornerstone of free markets, but the government may decide that it is better equipped than the private sector to judge what

is good (or not good) for its citizens. The classic restrictive example is Prohibition, but sin taxes on so-called demerit goods (or "bads") such as cigarettes and alcohol, and restrictions on prostitution and pornography are other cases of the government determining what citizens may be allowed to have. On the other hand, the government may encourage cultural activities or use tax benefits to promote private donations to charities.

Macroeconomic Stabilization Policy

The 1946 Employment Act charged the government with the duty of maintaining relatively stable prices, preventing substantial fluctuations in economic activity and employment, and fostering an environment conducive to economic growth.

In the face of declining demand, self-interest may lead a producer to close a textiles mill and lay off his workers. Although this action is in his own best interest, it can have detrimental effects on his employees and the local community and, through the knock-on operation of the expenditure multiplier, further adverse external effects may be experienced throughout the economy. Accordingly, the government may seek to stimulate demand, proactively or reactively, to keep the economy on an even keel.

The Size of Government

In 2015, federal, state, and local government expenditures on consumption and gross investment (G) accounted for 17.8 percent of GDP, or about $3 trillion. The federal government was responsible for about two-fifths of the total, while state and local governments spent the remainder.

This is not the complete picture of government involvement in national expenditures, however, because this value only includes expenditures by federal, state, and local governments on *final* goods and services. Federal government defense and nondefense expenditures account for only about one-third of Washington's budget. Government transfer payments, (that is payments for which no good or service is required in return) such as the food stamps program (that is now known as SNAP), veterans' disability benefits, and Social Security checks, are excluded from expenditures (G) because transfer payments are not made in exchange for final

goods and services. The influence of these transfer payments is reflected mainly in personal consumption expenditures (C), when food stamps are used to buy groceries or Medicaid benefits are used to defray the cost of health care by those with low incomes. Of the major categories of federal government outlays, the bulk (about 60 percent) involves transfers to households or other institutions (with some subsidies thrown in). Interest payments on the national debt amount to roughly 10 percent of outlays. The bottom line is that the government's influence on spending extends far beyond its own purchasing activities. The controversy in March 2013 about the severity of the effects of sequestration—forced multiyear across-the-board budget cuts in response to revenue shortfalls—highlighted the truth that government expenditures do impact the private sector.

A Comment on the Deficit and the Debt

The **federal deficit** (or surplus) is the difference between this year's federal government receipts and this year's federal outlays. The deficit is traditionally represented as G – T, where G is **government expenditures** and T is **net taxes**, or taxes minus transfers. If outlays exceed receipts then there is a deficit and this adds to the **federal debt**, which is the total amount owed by the federal government to the public as a consequence of this, and previous, deficits. A surplus reduces the size of the debt. The estimated deficit for 2018 is 392 billion dollars (down from $1.41 trillion in 2009) whereas the federal debt, in 2018, is in excess of 20 trillion dollars, with the debt per person greater than $60,000.

Citizens eye mounting deficits and debt with apprehension, but the view among orthodox economists has been more sanguine—a mounting national debt is nonthreatening as long as the ability to repay it is rising equally fast. However, since the surplus years of the Clinton administration (when tax rates were increased and expenditures cut), the debt has risen, as a percentage of GDP from about 70 percent to in excess of 100 percent in 2018. During the George W. Bush administration, cuts in the average tax rate and unexpected war-related expenses restored deficits, and the deficit rose sharply during the early part of the Obama administration because of stimulus spending, slumping tax revenues, and ongoing war-related expenditures.

THINK IT THROUGH: Are deficits a "bad thing?" There is no single unambiguous answer to this question! When the United States entered World War II and accumulated deficits during the struggle to defeat Nazi domination, few would argue that the nation's efforts should have been curtailed in order to balance the books. In addition, with so many workers unemployed, tax revenues declined during the Great Depression—but either cutting government spending or increasing tax rates as a consequence would seem counterproductive choices.

The majority view in economics is that the goal should be to balance the budget over the business cycle—deficits in years of famine and surpluses in years of plenty.

Fiscal Policy: Influencing the Economy by Spending and Taxing

Fiscal policy and monetary policy are the two broad avenues of economic influence. We shall consider monetary policy in Chapter 7. In each case, however, the overarching short-run objectives are economic stabilization and the control of particular economic variables of concern, typically output, unemployment, and inflation. Because there are compelling reasons to believe that demand-side fiscal policy is not effective in the long run, the focus for the remainder of this chapter will be short run. In addition, although fiscal policy actions may impact the economy's capacity to produce (in other words, the economy's supply side), historically, the primary thrust of fiscal policy has been manipulation of aggregate demand and it is on this aspect that we will concentrate. Policies that are best characterized as "supply-side" will be discussed in Chapter 9.

The Tools of Fiscal Policy

Fiscal policy has three main tools: government expenditure (G), taxation, and transfer payments. Together, taxes and transfers are termed *net taxes* (T). Initially, to simplify matters, we shall assume that the aggregate price level

is constant—that is, there is no price dampener effect and that taxes are "lump sum" in nature, that is, tax revenues are not related to income.

THINK IT THROUGH: Can you think of examples of taxes that are "lump sum" in nature—not affected by income level?

Property taxes on cars or homes, taxes on business equipment, or real-estate taxes imposed on a per lot basis irrespective of size are examples. A poll tax (or head tax) charging a fee per person would be a further example, such as the notorious community charge—a lump-sum payment per adult resident—that was imposed by Margaret Thatcher in Britain in the 1980s. In economies with poor record keeping or with an underdeveloped financial system where monetary transactions are absent or poorly reported, lump-sum taxes can be a convenient way of establishing tax liability.

Fiscal policy affects the economy through changes in aggregate demand. Ignoring net exports, the components of aggregate demand are consumption (C), investment (I), and government purchases (G).

$$AD = C + I + G$$

An *expansionary* policy is intended to increase the level of economic activity and create jobs by increasing aggregate demand whereas a *contractionary* policy is meant to reduce the level of economic activity, presumably to combat inflation, by reducing aggregate demand.

Expansionary Fiscal Policy

Because government spending is one of the components of aggregate demand, an autonomous increase in government spending will have a direct impact on aggregate demand, shifting the AD curve to the right and increasing the level of economic activity. Net taxes are not directly part of aggregate demand but still influence spending because, if net taxes are reduced, then households will receive more after-tax income and consumption spending will increase. (It is also possible that business taxes may be cut in order to encourage investment.) An increase in government spending or a decrease in net taxes is an expansionary policy.

The effect of an autonomous policy change in net taxes is weaker than that of an equivalent change in government spending. An autonomous

increase in government spending of 100 and an autonomous decrease in net taxes of 100 will each shift the AD curve to the right, but the increase in government spending will have the larger effect because it will increase aggregate demand dollar for dollar. The decrease in net taxes, however, will not increase aggregate demand dollar for dollar. If households receive an increase in after-tax income of 100, then consumption spending will increase, but some portion of the extra income will be saved. Saving is not part of aggregate demand. If, for example, the marginal propensity to consume is 0.8 (and the marginal propensity to save is 0.2), then aggregate demand will increase by only 80 as a result of the tax cut.

We learned in Chapter 5 that the effect of an autonomous change in a component of aggregate demand is multiplied through the economy by the operation of the expenditure multiplier (m), as shown in the formula

$$\Delta E_A \times m = \Delta y$$

If the marginal propensity to save is 0.2, then the value of the simplified expenditure multiplier (1/MPS) is 5. Given an autonomous increase in government spending of 100, if the multiplier is 5, then the AD curve will shift rightward, initially by 100 from y_0 to y'_1 (the autonomous shift), but ultimately by 500, from y_0 to y_1, as it is induced to rise through the multiplier process, as shown in Figure 6.1.

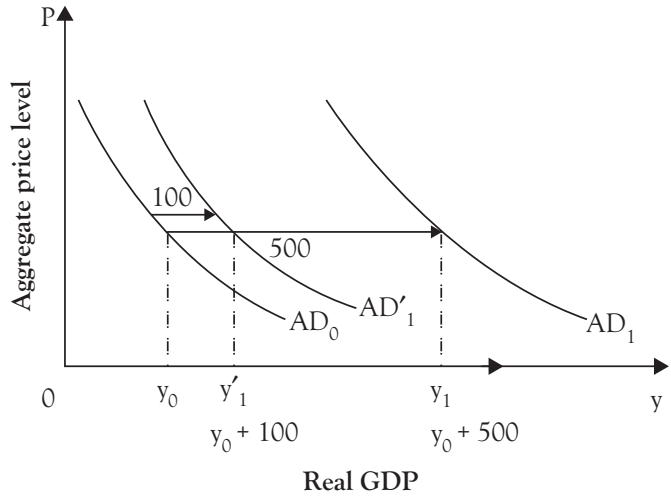

Figure 6.1 Initial and ultimate shifts in the AD curve of an increase in government spending

A decrease in net taxes has a similar, if weaker, effect. An autonomous decrease in taxes of 100, given a multiplier of 5, will make the AD curve shift rightward, initially by 80 from y_0 to y'_1, as consumption spending increases autonomously by that amount, but ultimately by 400, from y_0 to y_1, as shown in Figure 6.2.

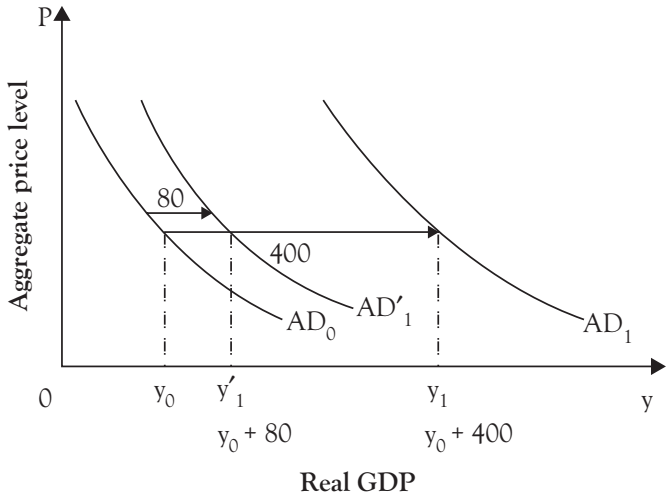

Figure 6.2 Initial and ultimate shifts in the AD curve of a decrease in net taxes

The Keynesian "transmission mechanism" for changes in government spending is summarized in Figure 6.3.

$$\Delta G_A \longrightarrow \Delta E_A\ (\times m) \longrightarrow \Delta y$$
$$+100 \qquad +100 \quad 5 \qquad +500$$

Figure 6.3 The Keynesian fiscal policy transmission mechanism for government spending

An autonomous increase in government spending (ΔG_A) of 100 flows directly as a positive autonomous change into expenditures (ΔE_A). The initial change in expenditures is multiplied by the "earning/spending" process, with income (Δy) ultimately expanding by 500 (still assuming that MPS is 0.2).

The Keynesian "transmission mechanism" for changes in net taxes is summarized in Figure 6.4.

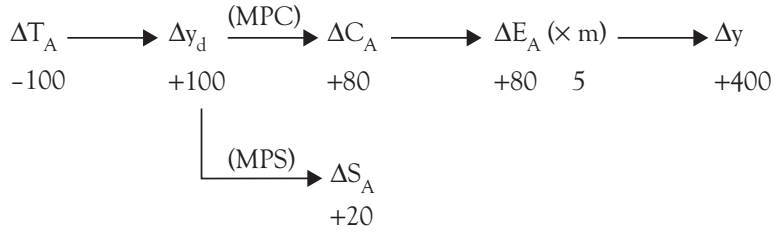

Figure 6.4 The Keynesian fiscal policy transmission mechanism for net taxes

An autonomous decrease in net taxes (ΔT_A) of 100 increases after-tax or disposable income (Δy_d) dollar for dollar. Part of the increase in disposable income will be spent and part will be saved—how much each element changes depend on the marginal propensity to consume and the marginal propensity to save. If MPC is 0.8, then consumption (ΔC_A) will increase by 80 and saving (ΔS_A) will increase by 20. Consumption is a component of expenditure; therefore there is an autonomous increase in expenditures (ΔE_A) of 80. The initial change in expenditures is multiplied by the "earning/spending" process, with income (Δy) ultimately expanding by 400. The autonomous change in saving of 20 is a leakage and does not contribute to the process. Ultimately, all of the additional after-tax income will leak away into saving and the process will come to an end.

Contractionary Fiscal Policy

If the government wishes to dampen down the level of economic activity, then the fiscal policy tools can be reversed. Cuts in government spending, hikes in taxes, or reductions in transfer payments will all reduce expenditures autonomously, shifting the AD curve to the left.

A Balanced-Budget Change

Every so often, there are calls for a balanced budget constitutional amendment, which would require changes in government spending and net taxes to be equal. Would this constraint negate fiscal policy? In theory, no, but, in practice, fiscal policy would become far more cumbersome.

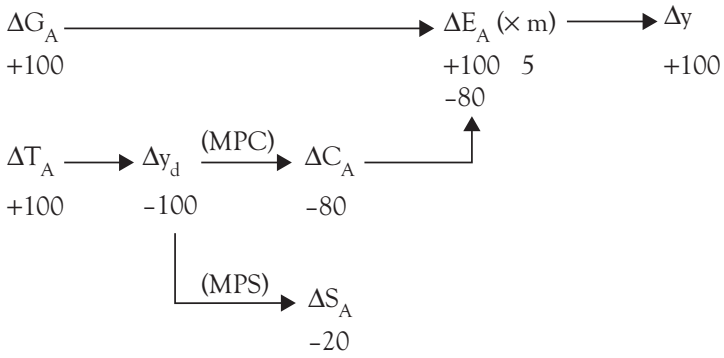

Figure 6.5 The Keynesian balanced-budget transmission mechanism

Keeping the values from the previous example, with MPS equal to 0.2, the multiplier 5, and assuming that the government's budget initially is in balance, let us examine the effect on equilibrium output of an autonomous increase of 100 in both government purchases and net taxes. At first glance, it might appear that the two changes would cancel each other out but this is incorrect.

The increase in government spending would make expenditures rise autonomously by 100, but the increase in net taxes (which would cut household income by 100) would have a weaker contractionary effect, reducing consumption spending by 80 and saving by 20. The net effect of the two policy actions would be to cause an autonomous increase in expenditures of 20. Given the size of the multiplier, the aggregate demand curve would shift to the right by 100. Equal (balanced-budget) increases in government spending and net taxes are expansionary whereas equal decreases are contractionary. This situation is summarized in Figure 6.5.

THINK IT THROUGH: In the balanced-budget example, we saw that an equal increase of 100 in government spending and net taxes resulted in an overall increase of 100 in income (Δy). Must the final expansion in income (Δy) equal the initial autonomous change?

In the simple Keynesian model described in this chapter, yes, but, in general, no! We have assumed away many real-world economic features, that would weaken the power of the multiplier. Investment, for example,

is assumed not to change as the economy expands—hardly likely. We have ignored the influence of the price dampener and the crowding-out effect. The implementation of fiscal policy is more complex than it might seem.

Problems with Discretionary Fiscal Policy

As represented earlier, fiscal policy seems attractive. Given a recession, a precise increase in government spending or decrease in net taxes should propel the economy smoothly to full employment. Similarly, given excessive inflation, a corrective contractionary action should set right the situation.

The real world is not so simple. There are problems that are applicable to any sort of discretionary policy and others that are specific to fiscal policy. First, the general problems.

General Problems in Implementing Stabilization Policy

We have made several important assumptions in constructing our economic model, assumptions that, if they do not hold, would make the conduct of policy far more complex. Several significant problems arise.

Time lags exist and they are variable: Any policy response involves delays—delay in the recognition that a problem exists (the recognition lag); delay in the construction and implementation of policy (the administrative lag); and delay in the operation of the policy within the economy (the response lag).

The *recognition lag* occurs because it takes time to detect the presence of an economic problem that will require action. Any economy suffers temporary surges and stalls in activity. Let us suppose that, today, the economy starts to slip into a recession. We will have no clue until economic data are published in a month's time. Even then, policy makers will wait for more data before concluding that this is, indeed, an economic slowdown requiring action. This lag may be exacerbated if politicians are loath to admit to economic problems or because of gridlock.

Once a problem is recognized, policy options must be considered, negotiated, and implemented—the *administrative lag*. Again, real-world political conditions would lead us to expect significant delays in hammering out and passing effective proposals.

Finally, once a policy is enacted, the effects may be slow to reach the economy—the *response lag*. A road-building project, for instance, may take months to plan and years to complete. As President Obama once remarked, "There are no shovel-ready projects."

Time Lags, Stabilization Policy, and the Great Recession

The Great Recession began in December 2007, following the bursting of the housing bubble, which itself was a major and easily observable economic event. Despite this, and although some commentators were remarking on a possible recession in January 2008, there was no political consensus that there was a *significant* economic problem for several months. The Economic Stimulus Act (passed in February 2008) was intended to prevent a *future* recession, not to correct a current one. This mild stimulus was wholly inadequate—policy makers had failed to recognize the extent of the downturn. Further, the tax rebates for low- and middle-income families did not reach those families immediately—several weeks elapsed while the economy sank—although, when the rebate checks were received, however, households did respond as predicted by spending the additional dollars.

The Emergency Economic Stabilization Act (October 2008) created the Troubled Asset Relief Program (TARP) largely as a response to the subprime mortgage crisis and the global financial crisis rather than to the recession *per se* but, to the extent that it was a response to the recession, it had taken almost a year for Congress to react.

Finally, in February 2009, *14 months* after the recession's onset, Congress passed the American Reinvestment and Recovery Act, designed to pump almost $800 billion into the economy but the recession ended in July 2009, *before the bulk of those funds could be spent*.

Policy makers face the challenge of hitting a moving target, while using a weapon of dubious reliability or accuracy. Milton Friedman referred to the challenge of achieving policy accuracy in the face of poor information and time lags as the "fool in the shower" problem, with policy makers repeatedly over- and underestimating the impacts of policy measures in a rapidly evolving situation.

The full-employment output level is not known: If we do not know the output level that will guarantee full employment then, even if we do

know the current state of the economy, the ability to implement effective policy actions is limited. Even the concept of full employment is elastic, with estimates changing over time.

The marginal propensity to consume is not constant: When we calculated the "simplified" expenditure multiplier, we made two important assumptions—that each individual would spend the same fraction of any additional income received and that that fraction (MPC) was known to policy makers. Evidence suggests, however, that the MPC of low-income households exceeds that of high-income households and that the general willingness to spend extra income is affected by whether the additional income is believed to be a temporary change or a permanent one—a temporary bonus or rebate is more likely to be saved, a permanent one more likely to be spent.

The expenditure multiplier is not constant: In the weeks before the passage of the American Reinvestment and Recovery Act, presidential advisers Christina Romer and Jared Bernstein published their estimate of the magnitude of the expenditure multiplier. In their view, the multiplier's value was approximately 1.6, meaning that a 100 million dollar increase in government spending would raise real GDP by only 160 million dollars. This was not the only bad news, however, as other studies revealed that Romer and Bernstein's estimate might be optimistically high. Other estimates of the fiscal multiplier placed its value much lower—perhaps as low at 0.5! To the extent that the size of the multiplier is open to doubt—and we saw in Chapter 5 that this is so—the ability of policy makers to determine the appropriate policy response is impaired.

The price dampener is not constant: The effect of the price dampener depends on the interplay between the slopes of the aggregate demand curve and the short-run aggregate supply curve and, as we saw in Chapter 5, the supply curve becomes steeper as full employment is approached, making the price dampener stronger and the effect of policy weaker.

Specific Problems in Implementing Fiscal Policy

The preceding points are relevant for any type of stabilization policy, but there are several other specific issues that can weaken fiscal policy effectiveness.

The Crowding-Out Effect: If an expansionary fiscal policy action causes increased government borrowing and higher interest rates, then the public sector expansion may crowd out private sector investment and consumption spending. The reduction in private sector spending reduces the potency of the fiscal policy action and, to the extent that it is unpredictable, adds a layer of uncertainty to the policy.

Capital Flight: An expansionary fiscal policy that boosts demand may also set up the expectation of higher taxes in the future and greater inflation. If so, businesses have an additional incentive to move operations offshore to shelter themselves from increased tax bills and rising production costs. This flight of capital and the consequent reduction in job opportunities has a further dampening effect on fiscal policy.

The Future Tax Effect: The effect of a tax change on household spending may be influenced by whether or not households believe the tax change to be permanent or temporary. If consumers respond differently to a permanent change than to one that is perceived as short-lived then the effectiveness of a given policy is rendered less reliable. For example, if consumers believe that a tax cut will be ongoing then, believing that their after-tax income has increased permanently, they will tend to spend more vigorously. If, on the contrary, the tax cut is thought to be merely temporary and likely to be followed up by a compensating tax increase

THINK IT THROUGH: If we believe that households do respond differently, based on their *perception* of a change in tax policy, then a tax cut enacted by a "credible" Administration will have a different (more profound) effect than the identical tax cut enacted by an Administration that is distrusted or suspected of perpetrating a quick fix that will soon be reversed. In government then, as in the business world, establishing trust in fair dealing is crucial. Given the progressively low, and declining, regard in which policy makers are held by the public, the future tax effect suggests that fiscal policy actions will become less potent and more unreliable.

in the future, and that, therefore, the overall effect on after-tax income will be slight, then the impact of the tax cut on consumer spending will be smaller.

The Ratchet Effect: There must be some reason why the federal government has run deficits almost every year since the beginning of the 1960s. To be sure, there have been wars that have placed demands on the public purse, but persistent red ink would seem to be a symptom of something other than a belligerent world. Significantly, following the collapse of the Soviet Union, there was talk of a "peace dividend," but the deficits continued, with relief coming in the later Clinton years because of increased taxes (in 1993 and 1997) and increased tax revenue flowing from the prosperity caused by the dot-com bubble.

It seems to be quite a challenge for politicians, reliant, as they are, on voter popularity for reelection, to pursue unpopular but necessary spending policies—cutting back on programs that have been set up to stimulate the economy after the need for stimulus has abated, removing "entitlements" that cannot be afforded, reducing defense spending when the nation is not at war, and suppressing the vote-attracting benefits of "pork"—and raising tax rates and the tax base or reducing tax-payer deductions when such measures are appropriate. In short, it could be argued that the politicians who establish our economic policy have a self-interested desire to ratchet up and preserve deficit-increasing programs—Santa Claus is better liked than Scrooge. The promise of cuts in programs and higher tax collections is a formula that remains unlikely to promote success on the hustings or to attract many campaign contributions.

Assessment of Fiscal Policy Effectiveness

Although our ADAS model might lead us to believe that fiscal policy is capable of precise economic surgery, the real-world evidence strongly suggests that it is a rather blunt instrument, useful more for causing broad shifts in the economy than for "fine-tuning." In addition, poor forecasting and sluggish monitoring of economic data hamper policy effectiveness. Taken in combination with a faith in the speed and strength of the economy's self-correcting mechanism, a number of economists have discounted the usefulness of discretionary fiscal policy except in times of

severe crisis, although, given the asymmetrical nature of the mechanism, corrective fiscal policy during recessions remains a viable if unpredictable option for most economists.

Automatic Stabilizers: Nondiscretionary Stabilization

The government has fiscal policy tools at its disposal that it can choose to deploy during economic downturns or upswings in order to stabilize the economy. The economy also has nondiscretionary **automatic stabilizers** that lessen the swings in GDP as the economy moves through the business cycle. Revenue and expenditure programs or policies established in the federal budget that adjust in magnitude as the level of economic activity changes are examples of automatic stabilizers.

Automatic Stabilizers during a Recession

During a recession, when incomes are falling and greater numbers of workers are on the unemployment rolls, more transfer payments are pumped into the economy in the form of unemployment compensation and welfare, partly replacing the lost wages and salaries—spending falls less than it otherwise would have.

In a situation of declining employment and income, income tax liabilities also decrease. Ours is a mildly *progressive* income tax system and acts as a weak stabilizer.

A Digression on Tax Systems

Tax systems may be progressive, proportional, or regressive. To understand the differences, we must define two new concepts—the *average tax rate* and the marginal tax rate. The average tax rate is the fraction of every dollar earned that is paid in tax. If you earn $100,000 and send the IRS $10,000, then your average tax rate is 10 percent. The *marginal tax rate* (MTR) is the fraction of each *additional* dollar earned that is paid in tax. If you accept some secondary employment, worth $50,000, and your total tax liability increases from $10,000 to $20,000, then your MTR on the extra $50,000 is 20 percent—tax has risen by $10,000 whereas income has risen by $50,000.

With a *progressive* system, the MTR increases as income increases—we are pushed into progressively higher tax brackets—and the average tax rate also increases. The marginal and average tax rates remain unchanged with a *proportional*, or "flat tax," system—the Social Security tax (until a specified income value, at least) is proportional. With a *regressive* system, as income increases, the marginal and average tax rates decrease. Such a system is destabilizing for the economy.

This can be deceptive. A 5 percent sales tax levied by a state may seem to be a flat tax but is, instead, regressive, as the following example shows.

A Regressive Tax Let us suppose that Smith earns $40,000 annually and Wesson earns twice as much. The state of West Dakota imposes a 5 percent sales tax on all purchases. Earning $40,000, Smith spends all of his income and saves none—he pays $2,000 in taxes, with an average tax rate of 5 percent. In contrast, Wesson, earning $80,000, is able to set aside $8,000 in a savings account. These funds are not subject to the sales tax and Wesson's tax liability is 5 percent of the $72,000 he spends, or $3,600. His average tax rate is 4.5 percent—$3,600 divided by $80,000.

The average tax rate decreases as income increases—a hallmark of a regressive tax system.

THINK IT THROUGH: One provision of the Tax Cuts and Jobs Act (2017) was a reduction in the amount of mortgage interest payments that could be deducted. Does such a change make the individual income tax system more (or less) progressive or regressive?

First, the original mortgage interest deduction was regressive. Certainly, the less well off would be more likely to rent than to own a home and, therefore, would not be eligible for the deduction. The tax break reduced taxes for homeowners and discriminated against poorer taxpayers—the sign of a regressive tax. To the extent that the 2017 Act reduced that bias, it made the tax system less regressive.

To the degree that federal income taxes are progressive whereas state and local sales, excise, and property taxes are regressive, the federal tax system operates as an automatic stabilizer but the state and local systems do the opposite!

Automatic Stabilizers during an Upswing

Automatic stabilizers function just as much during economic expansions as they do during downturns. With rising demand and spending, the progressive income tax system siphons off increasingly larger amounts of wages and salaries, dampening down the rate of expansion. Unemployed workers, finding jobs, see their new earnings offset by losses in unemployment benefits. The upswing in the economy is diminished.

Assessment of Automatic Stabilizers

Automatic stabilizers are a two-edged sword, having both attractive and unattractive features. Ignoring the issue of disincentives caused by a progressive tax and transfer system, automatic stabilizers keep the economy stable—a good thing if the economy is close to full employment, but unfortunate if it is not, because policy packages have to be stronger in order to overcome the inertia due to stabilizers. A reasonable body of evidence demonstrates that automatic stabilizers, in fact, do reduce the severity of business cycles although, on their own, they are unable to reverse them.

THINK IT THROUGH: In the aftermath of the Great Recession, with unemployment obstinately high and with unemployment benefits gone, many unemployed workers who had become "discouraged" applied for disability benefits. These benefits unintentionally served to prop up income and spending and to reduce the likelihood of a "double-dip" recession.

The Expenditure Multiplier Revisited

The Tax-Rate Dampener

In Chapter 5, we defined the expenditure multiplier (m) as 1/MPS, noting that the size of the multiplier in the American economy (roughly 2.0) seemed at odds with our knowledge of the marginal propensity to save, even if saving is taken to mean national saving rather than only personal saving. We broadened the multiplier definition to

$$m = 1/\text{Marginal Propensity to Leak}$$

The propensity to save more as income increases is one source of leakage; the progressive income tax system is another, drawing off spending power from the economy as income expands through the MTR and automatic stabilizers in general. We can add the MTR to our original definition of the expenditure multiplier as follows

$$m = 1/(MPS + MTR)$$

The more sharply tax brackets increase with income, the smaller the multiplier will be. We shall call this effect the *tax-rate dampener*. In this more complex model, the tax-rate dampener diminishes the size of the expenditure multiplier. We will extend our understanding of the expenditure multiplier in Chapter 7 but, for now, we extend the circular flow diagram we first met in Chapter 3 (Volume I) as shown in Figure 6.6.

As we can see, the introduction of the government sector permits an additional major leakage in the "earnings/spending" process, in the form

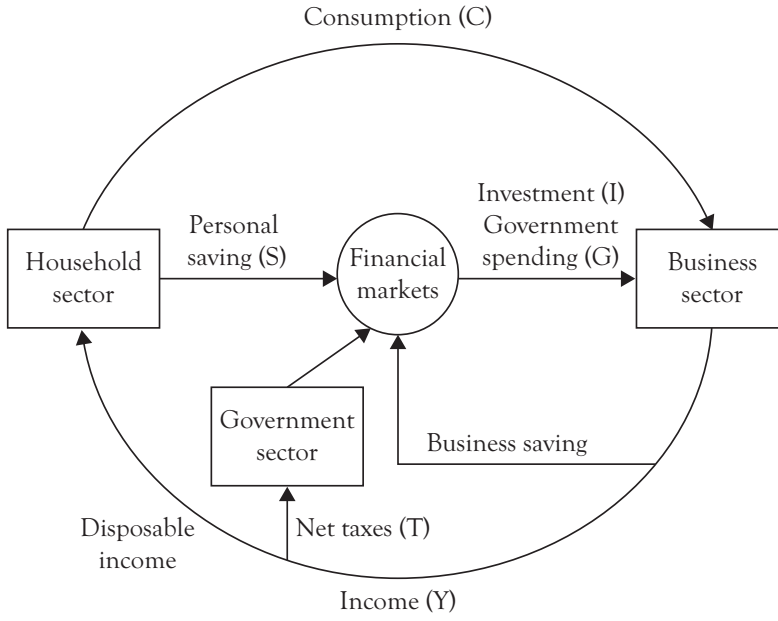

Figure 6.6 The circular flow diagram with a government sector

of tax payments. The diagram assumes that imbalances between net tax receipts and government spending (usually deficits) are dealt with in financial markets, as the government competes for funds with the private sector, with the consequence being the triggering of the crowding-out effect we discussed earlier. Indeed, as mentioned earlier, there is growing evidence that the expenditure multiplier has dwindled in strength over the years, with some recent estimates suggesting a multiplier value of less than 1.0 for some fiscal policy actions. Certainly, President Obama's stimulus package in 2009 has offered little evidence that a sizeable injection of spending would cause a rapid economic recovery, despite following hard on the heels of the Bush Administration's Emergency Economic Stabilization Act of 2008, TARP, and historically low interest rates.

Some fiscal policies are more powerful than others—as our model predicts, government spending changes wield a stronger influence than tax changes of a similar magnitude. Among spending programs, the multiplier effect of increasing food stamps is more powerful than that of increased federal aid to state governments. The impact of tax changes was even more muted. But, all in all, the consensus of recent research is that fiscal policy actions have only mild influence on overall economic behavior.

Negative Fiscal Multipliers Critics of discretionary fiscal policy even go so far as to suggest that fiscal policy actions are counterproductive, leading to fiscal multiplier effects that are negative in the long term! How might this paradoxical result occur?

Let us suppose that Washington increases grants to the states and that this increase in government spending has a small stimulatory impact in the short run. The policy has added to the deficit and, so the argument goes, the shortfall will have to be recouped at some point in the future, probably with higher taxes. The increase in taxes, though, will have a negative impact on the level of economic activity and, if the negative effect is sufficiently strong, the net effect of the initial increase in government spending will be negative.

As 2012 drew to a close, the economy's attention was focused on Washington's efforts to resolve the issue of the so-called fiscal cliff—the threatened across-the-board spending cuts that would be implemented

if action was not taken to bring the federal budget under control. The spending cuts were proposed in 2011 to control the swelling deficit (the Budget Control Act). In addition, in the absence of explicit action, Bush-era expansionary tax cuts were scheduled to expire at the end of 2012.

Considering just the Bush tax cuts, the relevance of these to negative fiscal multipliers was that, if, the tax cuts had been allowed to expire, then this action could have pushed the still-sluggish economy into a "double-dip" recession. If, conversely, the tax cuts were not allowed to expire then there would be a need for some offsetting tax hikes or spending cuts elsewhere in the budget. In either circumstance, the economy would have faced a long-term contractionary effect. As it turned out, Congress and the president opted for a compromise, raising some taxes while extending unemployment benefits. The issue of limitations on government spending was deferred for 2 months until sequestration was triggered in March 2013. Further disruptions threatened over the government's debt ceiling remained unresolved.

THINK IT THROUGH: How did the economy react to Washington's brinksmanship over the debt and deficit issues? Do you feel that last-minute policy-peddling is beneficial for or harmful to the business sector's ability to accomplish effective strategic planning?

Review: We have incorporated the government into our ADAS model in this chapter. The essential architecture of the model is unchanged from Chapter 5, but there is richer detail. Because, by its nature, demand-side fiscal policy is short run in impact—having no special ability to shift economy's long-run performance—this chapter has dwelt on short-run stabilization issues. Although its effective implementation faces particular challenges, discretionary fiscal policy can influence the short-run fortunes of the economy. Nondiscretionary (automatic) stabilizers, while not able to reverse a change in the economy, can reduce the severity of economic fluctuations.

CHAPTER 7

The Financial Sector

Money Matters and Interest Rates

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

- Identify three functions that money performs in the economy.
- Distinguish among barter, commodity money, and fiat (token) money.
- Define two different measures of the U.S. money supply (M1 and M2).
- Describe the process of money (deposit) creation. Define and explain the importance of the deposit multiplier.
- Describe how equilibrium is achieved in the money market.
- Identify three monetary policy tools and describe how they are changed to adjust the money supply in the pursuit of policy objectives.
- Explain the impact of the interest sensitivity of money demand on the effectiveness of monetary policy.
- Explain the impact of the interest sensitivity of investment and consumption spending on the effectiveness of monetary policy.
- Describe how the monetary dampener reduces the size of the expenditure multiplier.
- Outline how monetary policy can "accommodate" fiscal policy and enhance its effectiveness.

Unless you are quite unusual, the topic in the first part of this chapter will pose one particular problem for you. Our subject is "money" and, almost certainly, your preconceived image of money will differ from any definition of money that you will meet in this chapter! Even the very narrowest

definition of the money supply (M1) includes traveler's checks, for instance, whereas a somewhat broader definition (M2) includes items such as certificates of deposit. No definition of money includes credit cards and the notes and coins held in banks also are not part of the money supply. As we begin this chapter, think about the roles that money plays in the economy, and, based on these roles, try to find a suitable definition for money.

Chapter Preview: In this chapter we consider how the financial sector influences the economy. First, we must determine what money is and what it does. Following this, we examine the market for money and how the financial authorities may manipulate that market in order to affect the broader economy.

Functions and Definitions of the Money Supply: What Money Does and What Money Is

In this section, we look at how and why money evolved, define money, and consider the functions that money performs in a modern society.

A Brief Evolutionary History of Money

In early human history, there was no need for money. As hunter-gatherers, primitive humans foraged in extended family groups, living hand to mouth. As herders, though, they may have encountered other groups and, desiring to trade some surplus stock, they would have bargained and traded goods for goods. *Bartering* in this way is usually a cumbersome process because it requires a *double coincidence of wants*—you must want what I have to trade and I must want what you have to trade. If one of the two "wants" is absent, then trade can't occur.

THINK IT THROUGH: Even ignoring the problem of finding a trading partner with a double coincidence of wants and negotiating a satisfactory deal, the barter system is inefficient in the sense each trader must hold a substantial range of trade goods in expectation of the day when a visitor arrives with just that item that is most desired. One would not wish to pass up an opportunity because of a lack of tradable goods. Accordingly, we would expect a barter economy to have a fairly significant amount of production that is underutilized.

Clearly, as farming grew in importance and as families stopped being self-sufficient and realized that there were gains to be derived from specialization and trade of one's surplus, a better system than barter was required to facilitate that trade. The first step was the introduction of a good that not only was valuable in its own right but also was acceptable as a means of payment—a *commodity money*. Commodities such as gold or silver, tobacco or pelts, shells or beads, have all been used as a means of payment. The Aztecs and Maya used cocoa beans—the commodity was acceptable because of its intrinsic value and because the understanding was that, if the recipient had no use for more cocoa beans than he already had, then they were universally acceptable as payment for a good that he wanted.

Characteristics of a "Good" Money

Like any type of money, to be effective as a "good" money, commodity money requires particular characteristics—it must be portable and divisible (gold is good, goats are not), durable and comparable (cocoa beans are good, cows are not), and restricted in supply.

THINK IT THROUGH: In *The Hitchhiker's Guide to the Galaxy*, Douglas Adams describes the Golgafrinchams choosing the leaf as their currency. They discover that the leaf is a poor choice because, with so many leaves available, inflation becomes rife, prompting them to burn down the forests! In addition to the difficulties involved in restricting supply, because the leaf is not intrinsically valuable, durable, or comparable, the Golgafrinchams would have been wiser to have opted for one particular type of leaf that is durable, difficult to substitute or counterfeit, and valuable in its own right—tobacco, for instance.

Gold (or silver) is a good candidate as money, especially if its quality can be "guaranteed" by being formed into coins with an official stamp of approval. Like leaves though, the value of gold (or silver) depends on supply and, when supply increases sharply (the California gold rush, the Klondike), the value of the metal decreases and inflation ensues.

The final evolutionary step (so far) has been the development of fiat or token money. *Fiat money*, such as a dollar bill, has little intrinsic value—it

is worth a dollar only because the financial authorities say it is worth a dollar. Because, on the rare occasions when the metal content of silver and copper coins has risen above the face value of the coins themselves and opportunists have sought out those coins and melted them down, it is in the best interests of the financial authorities to make sure that our tokens are intrinsically worthless.

Fiat money bestows a greater ability on the issuing authority to control the supply of currency. In addition, the value of resources tied up in the money stock is less—contrast the difference in the value of resources needed to mine and refine an ounce of gold and the value of those needed to run off its current price of $1,337.30 in bank notes. Because the use of fiat money also bestows a greater ability to overproduce currency, with the attendant destabilizing inflationary consequences and loss of confidence, financial authorities typically strive to protect the integrity of their currency.

THINK IT THROUGH: Public acceptability of a currency is key to its success. If citizens lose confidence in the integrity of their nation's money, then its function as a facilitator of trade is impaired. This is why a government will go to such great lengths to instill confidence in its currency, and why counterfeiting is such a serious crime—it not only jeopardizes "restricted supply," but it also undermines confidence. During the First Gulf War, the American-led forces dropped bundles of counterfeit banknotes throughout Iraq—financial warfare designed to disrupt the economic mechanism.

The Trial of the Pyx Every year since 1282, the coins of the British Royal Mint have come under independent scrutiny by a jury to guarantee that they conform to standards of diameter, metal composition, and weight. In early times, when the temptation and ability to debase gold and silver coins was greater, the Trial was held quarterly. The point of the Trial is simple—to reassure users of British currency that, although it may no longer be "as good as gold," it is at least as good as money should be. With currency, confidence counts for a great deal.

Functions of Money

Money fulfills three major economic functions—it is a medium of exchange (or means of payment), a store of value, and a unit of account. As we discuss each one, consider the injurious effect of inflation.

Medium of Exchange

For most of us, the primary function of money is to buy the things we need. Money maybe can't buy us love, but it can buy most other things. By specifying that goods and debts can be settled legally with a transfer of "money," barter's clumsy double coincidence of wants is avoided. Money is the oil that makes the economic engine run smoothly.

Inflation damages this function of money because, if prices rise, the supplier of a real good such as corn may be unwilling to accept monetary payment, preferring to revert to the certainty of barter—at least, with barter, you get something that will remain acceptable in trade. If money is the oil in the engine, then inflation is a contaminant.

Store of Value

When we get our paycheck, it is unlikely that we will spend all of it immediately. Some portion will be retained and we expect that portion to maintain its value. In this sense, money operates to transfer potential purchasing power across time. We can accumulate funds received in previous months to be used when we go on vacation—our expectation is that the money will store its value until it is needed. Money is not unique in this function—any asset that retains its purchasing power is a store of value.

Inflation impairs this function of money too. As prices rise, the dollar in your wallet shrinks in value. It may become wiser to hold your wealth in another form that is retaining its purchasing power more effectively—real estate, collectible baseball cards, or stock. In such circumstances, *liquidity* (the ease and cost of converting an asset into purchasing power) must be considered. A particular asset may be a hedge against inflation but if, when you need the spending power, you find it difficult or expensive to convert that asset into cash (in other words, if it is fairly "illiquid"), then the convenience of money may be the better option.

Cash is unique in the sense that it is perfectly liquid—it is purchasing power embodied.

Unit of Account

Money is what we use to keep score—the dollar is our yardstick and its use in virtually all of our transactions gives transparency and ease of comparison between options, such as items on a menu or salaries of executives. Complex aggregations—GDP, for instance, or a sales rep's monthly performance—are simplified by being measured in dollars. We can judge the financial success of movies by comparing their gross receipts at the box office. This convention is convenient and fairly reliable, but inflation is detrimental to comparisons, especially when comparisons over time are attempted. Certainly, *Gone with the Wind* or *The Sound of Music* were huge box office successes but because ticket prices in 1939, or even in the 1960s, were so low, neither movie dents the list of "all-time" top grossing movies.

Definitions of Money

In the previous section, it was stated that cash is perfectly liquid. While this is true, it is wrong to assume that "money" is also perfectly liquid. Although cash is part of the nation's money supply, it is *only* a part and, in fact, not even the largest part. There are several widening definitions of money but we will be content with the two most frequently seen definitions—M1 and M2.

M1

Ml (or "narrow" money) focuses on the "medium of exchange" function of money, counting those financial instruments that we use to purchase goods and services. M1 includes currency (notes and coins) held by the public outside banks and the value of the public's checking accounts inside banks. Checking accounts (usually just over half of the value of M1) comprise demand deposits and other checkable deposits (such as "negotiable orders of withdrawal," or NOW accounts). Traveler's checks (a tiny portion of M1) are used for purchases so they are also included.

M1 = currency held by the public outside banks
+ checkable deposits + traveler's checks

THINK IT THROUGH: This phrase "held outside banks" is significant. If a dollar bill were always "money" irrespective of who holds it then, by depositing a dollar bill into my checking account, I would cause the money supply to increase—the value of my checking account would rise by one dollar but "cash" would remain unaffected. To prevent this miscounting, as the dollar bill slides over the counter and is received by the banker, it ceases to be part of the money supply. My deposit will change the composition of the money supply (currency down, deposits up) but not its size. This is an important point and we will return to it.

THINK IT THROUGH (MORE)**:** "What about credit cards? I use my credit card to pay for restaurant meals, hotel rooms, airline flights, and so on. If money is what we use as the medium of exchange, then surely my Visa card must be included!"

Credit cards do not feature in any definition of the money supply. The reason is simple. When you use a credit card, the credit card company, in effect, is extending a loan to you. The transaction is not completed until you pay off the credit card account—typically with a payment from your checking account. Payments made using a *debit* card are monetary transactions, since the debit card accesses your checking account. Apps that access your checking account during transactions are transferring money; apps that access your credit card are not.

M2

M2 (or "broad" money) focuses more on the "store of value" function of money, including items that most of us would be unlikely to classify as "money," such as certificates of deposit. M2 includes everything in M1 plus savings accounts, money market accounts, money market mutual funds, and "small" time deposits (that is, certificates of deposit of under

$100,000 in value for which one must give prior notice before withdrawing). The assets in M2 are less liquid than the assets in M1—there may be a "penalty for early withdrawal"—but they are still quite readily convertible into spending power.

As a rule of thumb, M2 is usually somewhat more than four times larger than M1. In November 2017, M1 was $3,617.7 billion whereas M2 was over 1.3 trillion dollars. (If you're interested, you can find more information on the composition of the money supply at federalreserve.gov.)

The Money Creation Process: Prudence versus Profit

In this section we explore how money is created (or destroyed, if the process is reversed). During the process of receiving deposits and extending loans in pursuit of profit, bankers discovered that they had the capacity to create spending power for their customers. This ability is both attractive and dangerous—attractive because money creation can generate profits; dangerous because it can lead to inflation and, possibly, bankruptcy. Following a wave of bank collapses and a crisis of confidence in the banking sector at the turn of the 20th century, it was felt that a regulator was required to inject prudence into banking matters and so, in 1913, the Federal Reserve System (the "Fed") was established.

The "Fed"

The Fed sits at the heart of the financial system. It performs many functions but, for us, the main ones are that it sets limits (reserve requirements) on how aggressively banks can lend out their depositors' funds and it determines and implements monetary policy. The Fed is the banks' bank—just as the public can deposit funds in or borrow funds from Bank of America, so Bank of America can deposit funds in or borrow funds from the Fed. The Fed may act as a "lender of last resort" for a bank in trouble, either one that may be a small player or one that is "too big to fail."

The Money Creation Process: Simplifying Assumptions

Let us simplify the model by looking at the narrow money supply and assuming that it includes only *currency* (CC) or *notes and coins held by*

the public outside banks, and *demand deposits* (DD). We will ignore other checkable deposits and traveler's checks. The money supply (M) is

$$M = CC + DD$$

Further, we assume that, at the start of the process, all banks are fully "loaned up," that is, every bank in the system has loaned to their maximum extent—there are no loans to be had anywhere, at any price. Also, we assume that all banks have the same reserve requirement. To explain: When you deposit a $100 banknote into your checking account, your bank's balance sheet is affected in two ways. First, its *assets* (the things the bank owns) increase by $100 as it now holds the $100 bill—more on the significance of this later. Second, its *liabilities* (the things the bank owes) increase by $100 because you have a claim worth $100 against the bank—it has a demand deposit liability that it is obliged to repay. Your bank could lend out all of the $100 deposit that it has received from you—lending, after all, is how banks earn revenue. However, there is a tug-of-war between profit and prudence. The more the bank lends, the more revenue it earns, but the more it lends, the more likely it is to have insufficient funds available when depositors wish to withdraw their funds as cash. Clearly, there is some compromise between profit and prudence and, history has shown, bankers sometimes miscalculate, lending so freely that they are unable to meet their obligations to depositors and must declare bankruptcy.

THINK IT THROUGH: If you are of a certain age, you may well have an image in your mind of James Stewart and *It's a Wonderful Life*. The banking problem that Stewart's character faced in that movie (over-whelming withdraws) is the one we're considering now.

To impose prudence, the Fed sets a *reserve requirement* that each bank must retain a fraction of its demand deposits in reserve. Reserve requirements are imposed on "depository institutions," including commercial banks, savings banks, savings and loan associations, credit unions, and some more specialized financial firms. If the **required reserve ratio** or *liquidity ratio* (rr) is 10 percent then, if a bank has one million dollars in

demand deposit liabilities, then it may lend out $900,000 of those deposits but it is required to hold $100,000 in reserve.

THINK IT THROUGH: Is the reserve requirement the same for all banks? In fact, it is not. Currently, it is 10 percent for institutions with checkable deposits in excess of $71.0 million, 3 percent for institutions with deposits between $16.0 million and $122.3 million, and zero for institutions smaller than that. Although the cutoff points vary over time, the ratios are fairly stable.

THINK IT THROUGH (MORE): If reserve requirements are in place to guard against banks being unable to meet their obligations, it would seem plausible that a larger bank (with more assets and a broader geographical base) would be more likely to ride out a panic than would a small local bank with few assets. If so, then shouldn't the more stringent requirement be placed on the smaller banks? And, if so, why is it not?

This argument is reasonable—smaller, more narrowly based banks are more likely to succumb to "runs" or other adverse regional conditions and, therefore, ought to meet higher standards than the more stable national organizations. The reason that the opposite is true is because it has long been felt that it is advantageous to have competitive local "grass roots" banks. The preferential treatment permits them to lend more aggressively and to survive in the face of large predatory banks that reap the benefits of economies of scale and that would probably otherwise undercut them.

Banks are required to hold a fraction of their demand deposit obligations "in reserve." A bank's total reserves (R) may be held as *vault cash* (the usual case) or as *deposits at the Fed*. For instance, as you deposit your $100 bill and it slides across the counter to the banker, it becomes part of the bank's vault cash. If the bank subsequently deposits the $100 bill into its account with the Fed, then it is reclassified as "deposits at the Fed." In either form, the $100 bill counts as bank reserves. If the required reserve ratio is 10 percent, then $10 must be held as required

reserves (RR) but, because the other $90 are excess reserves (ER), they may be loaned out.

To summarize, a bank's total reserves may be held either as vault cash or as deposits at the Fed. Some portion of these reserves is earmarked as *required* reserves but any other reserves are *excess* reserves and are available to be loaned out.

$$R = RR + ER$$

At the start of the money creation process, we assume that all excess reserves have been loaned out—in other words, banks have only required reserves left on hand.

Our final assumption is that those who borrow funds from banks will then spend the loan and that the subsequent recipients of those dollars will redeposit them in the banking system—in other words, there are no *currency drains*.

Table 7.1 shows the money creation process in an economy in which the required reserve ratio is 0.1 (10 percent). In our example, the process, which could be initiated in several ways, begins when Andrew suddenly deposits $1,000 into his bank (Bank A).

Bank A's reserves increase by $1,000, of which $100 are required reserves (which can't be loaned out) and $900 are excess reserves (which can be loaned out). The bank loans $900 to Peter. Usually, the loan will be in the form of an increase in the borrower's checking account but, for simplicity, we will assume the bank gives Peter cash. Bank A's (excess) reserves are gone but it has a loan asset with Peter instead—it now has the $1,000 deposit liability, $100 in required reserves, and $900 in loan assets.

THINK IT THROUGH: The "change in excess reserves" column in Table 7.1 contains two steps, the first indicating the initial increase in excess reserves, the second assuming that all excess reserves have been loaned out as cash.

Peter spends the $900 at Brenda's store and she deposits the funds in her bank (Bank B). Bank B has $900 in deposits from Brenda—$90 in required reserves, and $810 in excess reserves. Bank B lends $810 to Eric.

Table 7.1 The money creation process

Bank/depositor	New demand deposits	=	Change in reserves (R)	=	Change in required reserves	+	Change in excess reserves	=	Change in loans/borrower
A/Andrew	1,000.00	=	1,000.00	=	100.00	+	900.00 /0	=	900.00/Peter
B/Brenda	900.00	=	900.00	=	90.00	+	810.00 /0	=	810.00/Eric
C/Colleen	810.00	=	810.00	=	81.00	+	729.00 /0	=	729.00/Thelma
D/Della	729.00	=	729.00	=	72.90	+	656.10 /0	=	656.10
E	656.10		656.10		65.61	+	590.49 //0	=	590.49
		=		=					
Total	10,000.00	=	10,000.00	=	1,000.00		0		9,000.00

Bank B's excess reserves fall to zero, but it still has the $900 deposit, $90 in required reserves, and $810 in loan assets.

Eric uses the proceeds of the loan to buy a new carpet at Colleen's Carpet Closet. Colleen deposits $810 in her bank (Bank C). Bank C's reserves increase by $810, of which $81 are required reserves and $729 are excess reserves that can be loaned out. When Bank C lends $729 to Thelma, its excess reserves fall to zero, but it still has $810 deposit, $81 in required reserves, and $729 in loan assets. When Thelma spends the cash in Della's Boutique, Della's subsequent deposit will increase the money supply by $729.

And so on. The process continues, each time with progressively more of Andrew's initial injection of reserves leaking into required reserves. It ends only when all of Andrew's initial $1,000 deposit has been transferred to required reserves and is no longer available to lend out. At that point the process must stop.

At the end of the process, Andrew's initial $1,000 demand deposit has been multiplied into a $10,000 increase in demand deposits—a 10-fold increase. In this example, the value of the **deposit multiplier** (d) is 10. There has been an initial (autonomous) increase in deposits of $1,000, followed by a subsequent increase in deposits (by Brenda, Colleen, Della, and so on) of $9,000, for a total of $10,000.

THINK IT THROUGH: For the banking system, the $10,000 expansion in demand deposit liabilities is balanced on the asset side of their balance sheet by $1,000 of required reserves and $9,000 of loan claims.

The size of the deposit multiplier is determined by the required reserve ratio (rr) because, on each cycle of the "lending/spending/depositing" process, a specified fraction of the deposited funds must be withdrawn from the process. The formula for the deposit multiplier (d) is

$$d = 1/rr$$

The greater the required reserve ratio (that is, the greater the amount of reserves that banks are required to retain and not lend out), the smaller the deposit multiplier.

We have found that a $1,000 increase in bank reserves can lead to a 10-fold expansion in demand deposits, courtesy of the deposit multiplier:

$$\Delta R \times d = \Delta DD$$

As we will see later in this chapter, this relationship between changes in available reserves for banks and changes in demand deposits is the key to understanding how monetary policy functions.

A Small Point: We know that demand deposits have increased by $10,000, but has the money supply also increased by $10,000? In this example, no, it hasn't!

Recall that the money supply (M) is

$$M = CC + DD$$

When Andrew deposited the $1,000 that started off the process, currency held by the public decreased by $1,000, so the net increase in the money supply is only $9,000. (If the increase in bank reserves is initiated in a way that doesn't reduce currency—for example, a purchase of bonds by the Fed from the banking system—then the offsetting change will not occur, and the money supply *will* increase 10-fold. Because of this, the deposit multiplier is frequently, if inaccurately, known as the "money multiplier.")

As you will recognize, the deposit creation process is quite similar to that described for the expenditure multiplier in Chapter 5. To get an intuitive feel for the deposit expansion process, you can use a diagram similar to the one presented there. In this case, the public is split into borrowers and depositors, but otherwise the argument is the same to that demonstrated in Chapter 5. Here, the leakage occurs when banks retain funds as required reserves.

In reality, other leakages reduce the size of the deposit multiplier. Such leakages include borrowers or depositors preferring to hold funds as currency *(currency drains)* instead of passing them on to the next step in the process, or banks choosing to hold excess reserves instead of loaning them out. The deposit creation process and the leakages that reduce its strength are depicted in Figure 7.1.

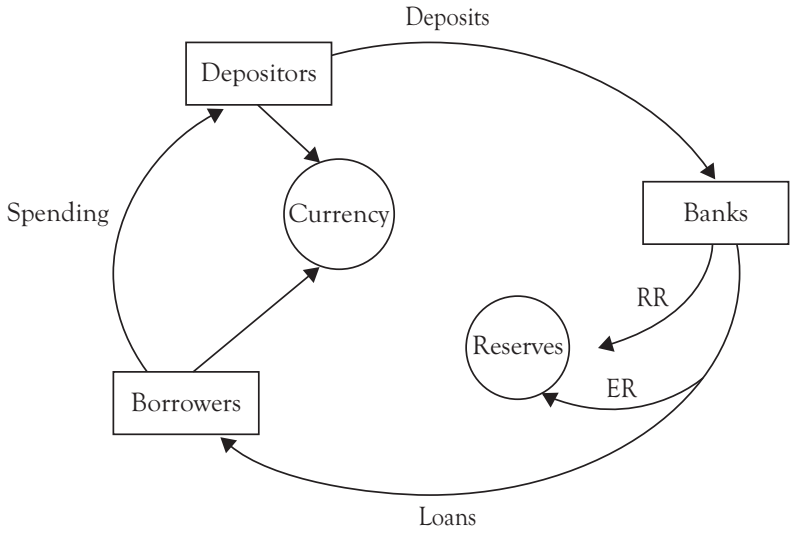

Figure 7.1 Financial sector circular flow diagram

Each time a member of the public deposits funds into his or her checking account the money supply increases and more reserves are received by banks to continue the process.

THINK IT THROUGH: Is the size of the deposit multiplier relatively stable? How might it vary in response to changing economic conditions?

We should expect the deposit multiplier to vary with such factors as the business cycle and the degree of optimism in the economy. During "good times," banks, eager to lend to the many creditworthy applicants they encounter, will reduce the amount of funds retained as excess reserves, and the deposit multiplier will move closer to its maximum value. However, during recessions, with greater risk of default, banks will become more cautious, holding back more funds as excess reserves, and the deposit multiplier will decline. Historically, banks have maintained low levels of excess reserves but, during the Great Recession, they accumulated significant excess reserves and this behavior made the deposit multiplier sink far below its theoretical value.

In this section, we have discovered that there is a "multiplier" relationship between commercial bank reserves and demand deposits, and that changes in bank reserves can fuel changes in the money supply.

The Market for Money: Money Supply, Money Demand, and the Interest Rate

In this section, we construct a model of the money market. In the money market, the interest rate can be thought of as the opportunity cost or the "price" of money. We will analyze the factors that influence the quantity of money demanded as the interest rate changes and the factors that affect the demand for money but, first, we will examine the supply side of the market.

The Supply of Money

We have already done the heavy lifting in understanding the behavior of the quantity of money supplied as the interest rate changes. In general, there is a positive relationship between the interest rate and the quantity of money supplied, as shown in Figure 7.2.

First, when the interest rate—the reward for lending—increases, banks will lend out more aggressively by reducing the amount of excess reserves they retain. As excess reserves are reduced and as more loans are generated, the quantity of money in circulation (in truth, the quantity of demand deposits) will increase. At the same time, when the interest rate increases, there will be a reduction in the currency drains that reduce the strength of the money creation process—members of the public will reduce their holdings of currency as the reward increases for holding funds in the form of bank deposits. Both of these factors combine to cause the financial sector to process reserves more actively as the "price" of money increases and, therefore, the money supply curve (M) is upward-sloping.

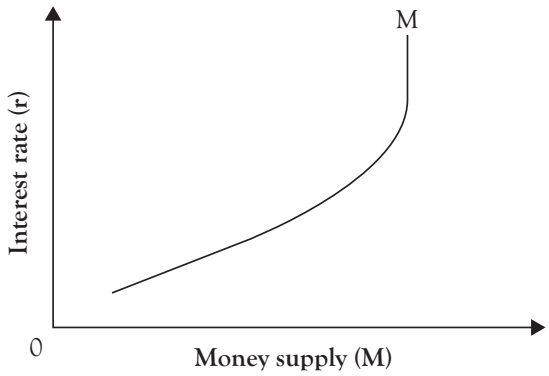

Figure 7.2 The supply of money

THINK IT THROUGH: At some interest rate, all currency drains and holdings of excess reserves will be reduced to zero and, at that interest rate, the deposit multiplier will have achieved its maximum value. Further increases in the interest rate will have no effect on the quantity of money supplied—the money supply curve will become vertical.

Factors That Can Shift the Position of the Money Supply Curve

The nation's money supply (CC + DD) depends on the **monetary base** (also known as *high-powered money*), which is composed of currency held by the public (CC) and bank reserves (R). The currency component of the money supply has a one-to-one relationship with the currency component of the monetary base but, we know, demand deposits have a multiplied value relative to reserves so the monetary base supports a quantity of money larger than itself.

If the level either of currency or of reserves changes, or if the value of the deposit multiplier changes, then the size of the money supply will change. If, for example, the required reserve ratio is reduced then the money supply curve will shift to the right. If the level of bank reserves is reduced, then the money supply curve will shift to the left. It is unlikely that currency held by the public will change significantly so, from now on, we will ignore that possibility.

In summary, given the interest rate, the money supply curve will shift in response to a change in the quantity of bank reserves or a change in the size of the deposit multiplier.

The Demand for Money: Liquidity Preference

We have established that money fulfills several important functions, chief among them being as a medium of exchange. As economic agents, we have two competing objectives—we seek liquid assets in order to buy the goods and services we desire but we also wish to allocate our financial assets in order to receive earnings from them.

There is a negative relationship between the interest rate and the quantity demanded of money, as shown in Figure 7.3.

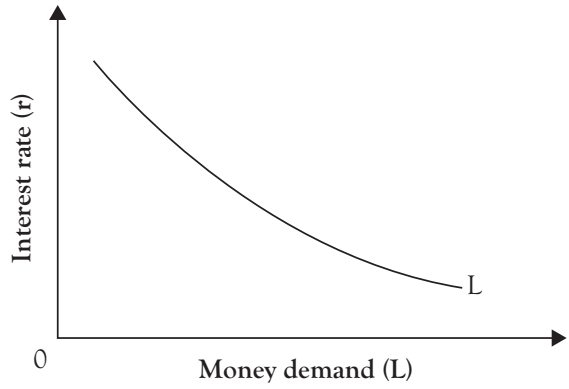

Figure 7.3 The demand for money

The negative slope of the demand for money curve (L) can be explained in several ways, but perhaps the simplest explanation is to observe that the higher the interest rate, the greater the opportunity cost of holding currency or demand deposits that yield little or no interest. The higher the interest rate, the more attractive it becomes to seek interest-bearing and less liquid assets (such as bonds) elsewhere in the financial sector so, therefore, individuals will seek to reduce their holdings of money.

Factors That Can Shift the Position of the Money Demand Curve

The position of the money demand curve will shift in response to changes in factors such as the level of economic activity (real GDP), the aggregate price level, and the technology of financial markets.

The demand for money will increase as the level of economic activity increases—more transactions will cause an increase in the demand for funds to finance them. The money demand curve will increase (shift to the right) during economic upswings and decrease (shift to the left) during recessions.

If real GDP remains unchanged, but the aggregate price level increases, then the demand for money to finance transactions will increase—the money demand curve will shift to the right.

Developments in the technology of financial markets such as debit cards, ATMs, and online banking have made it easier and cheaper to convert illiquid assets into cash. Accordingly, with reduced transaction costs, the public has become more willing to hold lower money balances than in the past.

THINK IT THROUGH: In the approach to the millennium, the "Y2K" panic caused a spike in the demand for money, as pessimistic members of the public, afraid that computer problems would prevent them from accessing their accounts, withdrew funds from their bank accounts. In anticipation of this mass action, the Fed increased the supply of reserves, thereby easing the strain placed on banks.

Equilibrium in the Money Market

Combining the money supply (M) and money demand (L) curves, we can analyze how the money market achieves the equilibrium interest rate.

Consider Figure 7.4. Let us suppose that the initial interest rate is r_1 and that the quantity of money demanded is low relative to the quantity supplied—the public has more money balances than it desires. In this situation, individuals will try to decrease their money holdings by increasing their holdings of bonds or by transferring funds to other interest-bearing assets.

Consider the market for bonds. Standard demand and supply analysis tells us that as a result of the increase in the demand for bonds, the price of bonds will increase. The influx of money into the bond market signals to issuers of bonds that this is now a seller's market and that they can attract funds from borrowers at a lower interest rate than had previously been necessary—there is a negative relationship between the price of bonds and the market interest rate. As the price of bonds rises, the interest rate declines. Because of this decline in the interest rate, there is

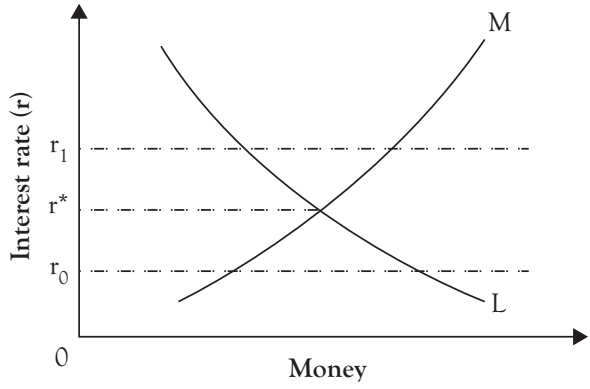

Figure 7.4 Equilibrium in the money market

an increase in the quantity demanded of money (a movement *along* the money demand curve) and a decrease in the quantity of money supplied (a movement *along* the money supply curve). The process will continue until quantity demanded and quantity supplied at equal (at r*).

If the initial interest rate is r_0, then the quantity of money demanded is high relative to the quantity supplied—there is a shortage of money balances. To get the money they desire, individuals will transfer funds from interest-bearing assets—they will sell bonds. More bonds will be available for sale. An increase in the supply of bonds will drive down bond prices and (given the negative relationship between bond prices and interest rates) push interest rates higher. The increase in interest rates will result in a decrease in the quantity of money balances demanded and an increase in the quantity of money supplied, until quantity demanded and quantity supplied at equal (at r*).

THINK IT THROUGH: What causes the increase in the quantity of money supplied as the interest rate increases? As the interest rate increases, the reward received by banks for lending is raised, encouraging them to lend more vigorously and to reduce their holdings of excess reserves while, simultaneously, currency drains by the public will be reduced. The deposit multiplier will increase in size and, given the reserves in the system, the quantity of demand deposits will expand.

If there is either a surplus or a shortage in the money market, then we would expect to see adjustments in the interest rate that would move the market toward the equilibrium interest rate (r*).

Single-Shift Cases

As we did in Chapter 2 (Volume I), let us apply demand and supply analysis to the money market. We are given four bits of information and asked to predict their consequences on the interest rate and the quantity of money in circulation. The four pieces of information are as follows:

Case 1. There has been an increase in the aggregate price level.
Case 2. The quantity of bank reserves has increased.

Case 3. The economy is experiencing a recession.

Case 4. The reserve ratio has been increased.

First, in each case, determine if there has been a change in the demand for money or a change in the supply of money. In each case, has the specified curve increased or decreased? Predict the effect on the equilibrium interest rate and the quantity of money.

The changes in Cases 1 and 3 affect the demand for money. In Case 1, rising prices provoke a greater demand for the medium of exchange whereas, in Case 3, the sluggish economy, suffering from a reduced level of transactions, will cause a decrease in the demand for money. The effects of Case 1 are shown in Figure 7.5.

The initial money demand and money supply curves are L_0 and M_0, respectively, and the equilibrium interest rate is r_0. The increased demand for money shifts the money demand curve right to L_1. Given the initial interest rate, there is now an excess demand for money and the public will respond to the shortage of liquidity by selling (liquidating) noncash assets such as bonds. The increased supply of bonds will cause the price of bonds to decrease and, given the negative relationship between them, the interest rate will increase until equilibrium is achieved, at r*. The effects of Case 3 are the reverse of this situation

The changes in Cases 2 and 4 affect the supply of money. In Case 2, the increased quantity of bank reserves will result in greater lending

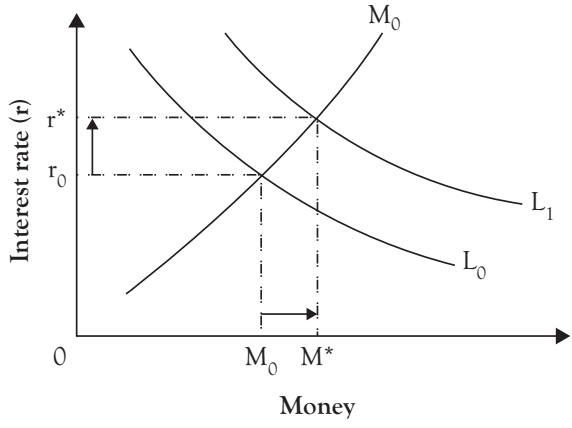

Figure 7.5 An increase in the demand for money

activity and money creation as banks seek to lend out the new excess reserves, shifting the money supply curve to the right, whereas, in Case 4, the money supply curve will shift to the left because the higher reserve requirement will reduce the size of the deposit multiplier, meaning that a smaller quantity of loans can be supported than was previously the case. (Note that, in Case 4, the quantity of reserves themselves has *not* been affected.) The effects of Case 2 are shown in Figure 7.6.

As before, the initial money demand and money supply curves are L_0 and M_0, respectively, and the equilibrium interest rate is r_0. The increased supply of money shifts the money supply curve right to M_1. At the initial interest rate, an excess supply for money now exists and the public will respond to the unwanted liquidity by transferring funds to assets such as bonds. The increased demand for bonds will drive up the price of bonds and the interest rate will decrease until equilibrium is restored, at r*.

In this section, we have constructed a model of the money market, explaining the shapes of the money demand and money supply curves and specifying important variables that can cause those curves to shift position.

Monetary Policy: Influencing the Economy through the Financial Sector

The Federal Reserve influences the overall economy by manipulating activities in the financial sector. How does it achieve this goal? First, we

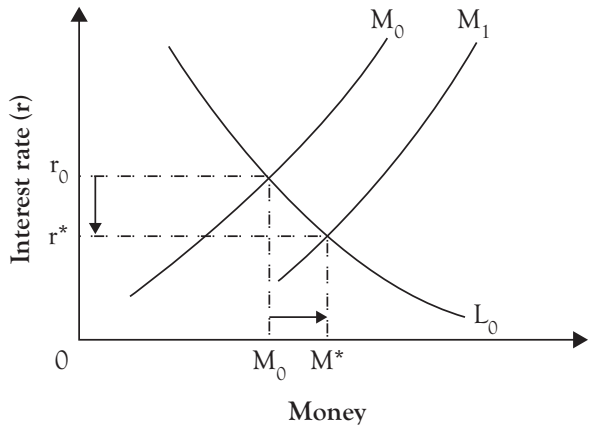

Figure 7.6 An increase in the supply of money

must address a theoretical issue—does the Fed use the money supply as its policy instrument of choice or does it use the interest rate? In the past, the focus was on adjusting the money supply but because the money supply is hard to quantify on a day-to-day basis, there has been a progressive shift in focus toward targeting a key observable interest rate—the federal funds rate.

As we have seen, banks find it convenient to hold a portion of their reserves as "deposits at the Fed" and, while many of these deposits are required reserves, others are not required reserves and these funds can be loaned out in the federal funds market. It is possible that a bank may find itself with insufficient reserves to cover its required obligations—if so, then it must borrow to meet its reserve requirement. One option for an institution in such a position is to borrow reserves directly from the Fed and, in this case, the interest rate charged by the Fed is known as the **discount rate**. Alternatively, a bank with deficient required reserves could borrow on a short-term basis (usually overnight) from a bank that has surplus balances of *federal funds*—if so, then the interest rate negotiated by the two banks is the **federal funds rate**. The Fed determines the actual discount rate that will be charged on a case-by-case basis, dependent on the financial condition of the bank applying for the loan, with troubled banks being charged more than sound banks.

Over the years, changes have occurred regarding relationships between interest rates. Before 2003, the discount rate was frequently lower than the federal funds rate. This offered an incentive for banks to borrow cheaply from the Fed instead of from another depository institution. Since then, however, new operating procedures have been introduced, keeping the discount rate above the federal funds rate, as the Fed wishes to discourage banks from borrowing at the discount window.

The interest rate on reserves: Prior to 2008, funds deposited at the Fed received no reward in the form of an interest rate. However, since then, in line with other central banks such as the Bank of England and the European Central Bank, the Fed has paid a modest interest rate on required and excess reserve deposits. This can be thought of as a lower bound on the federal funds rate. If the federal funds rate were to drop below this bound, then it would be more lucrative for banks to hold reserves than to lend to other banks or, put differently, the Fed can manipulate the federal funds rate by adjusting the interest rate on reserves.

At the time of writing (early 2018) the discount rate is 2.0 percent, the target federal funds rate is 1.5 percent, and the interest rate on reserves is also 1.5 percent.

In recent years, the Fed has found that targeting the federal funds rate is an effective method of signaling its stance on monetary policy. In practice, the Fed targets a range of values for the federal funds rate, adjusting its actions to maintain the effective rate within that range.

If the effective rate is higher than what the Fed wishes, then the Fed will buy bonds from institutions through open-market operations. This action has the effect of increasing the reserves of the participating institutions because they are exchanging bonds (which are not counted as reserves) for increased deposits at the Fed (which are). As a result, the number of banks with surplus reserves increases whereas the number with insufficient reserves and with a need to borrow federal funds is reduced—the federal funds rate decreases.

If the effective federal funds rate is felt to be too low, then the Fed will reverse the action—selling bonds at an attractive price to banks. The banks receive bonds (nonreserve assets) and give up some of the reserves that they have deposited at the Fed. The supply of federal funds is reduced while the demand for such funds is increased, causing the effective federal funds rate to increase.

Tools of Monetary Policy

There are three major tools of monetary policy and we have already touched on each of them, directly or indirectly. The tools, in ascending order of frequency of use by the Fed, are the required reserve ratio, the discount rate, and open-market operations. Be aware that other central banks, which have access to similar policy options, may not employ them with the same frequency or in the same proportions as the Fed. Japan, for instance, has been using quantitative easing since the 1990s and the People's Bank of China favors the use of the discount rate.

Consider once more the relationship between reserves and demand deposits and, by extension, the money supply and interest rates:

$$\Delta R \times d = \Delta DD$$

Required Reserve Ratio

At its simplest, the deposit multiplier is the reciprocal of the reserve ratio. If the Fed cuts the reserve requirement, then the existing quantity of bank reserves will be capable of supporting a greater quantity of demand deposits than before. By freeing up reserves that previously had been required reserves and allowing them to be loaned out to borrowers, a decrease in the reserve ratio permits the money supply to increase.

Conversely, if the Fed wishes to clamp down on the money supply, one option is to increase the reserve requirement. This will convert reserves that had been excess reserves into required reserves and reduce the ability of banks to lend. In such a scenario, banks may not have sufficient excess reserves on hand to convert into required reserves and, in order to satisfy the new requirement, they would probably have to borrow reserves from the central bank.

THINK IT THROUGH: The required reserve ratio is an extremely powerful tool of monetary policy but it is used rarely by the Fed. The requirement was reduced, for instance from 12 percent to 10 percent for large banks, in 1992 (but, even then, more to support bank profitability following the 1990 through 1991 recession than as an action intended to influence interest rates) but it has not been changed since. Changes (especially increases) in the reserve ratio are potentially disruptive to commercial bank balance sheets, which attempt to match new loans with maturing ones. Changing the rules in mid-game seems unfair, and forcing banks to find reserves to meet a higher requirement would present a challenge, almost certainly compelling banks to "call" loans (that is, to require repayment of loans that have been set up as repayable on short notice) and to borrow from the Fed at the discount window.

Discount Rate

The discount rate is the interest rate charged by the Fed to borrowing institutions. Borrowing from the Fed expands the borrowing bank's excess reserves and its capacity to lend and the discount rate can be seen as the cost of acquiring these reserves. A decrease in the discount rate reduces

the cost of excess reserves and, given the market interest rate, increases the profitability from lending to the public. A decrease in the discount rate, therefore, ought to encourage the banking sector to indulge in additional borrowing from the Fed and lending to the public, thus increasing the money supply.

When the discount rate is changed, there is a second effect in play that influences the size of the deposit multiplier and, through it, the money supply and interest rates. The discount rate may be thought of as the penalty for miscalculating reserve obligations. If the rewards from lending are high, then bankers will lend vigorously and will trim down their excess reserves until, perhaps, they have insufficient reserves to meet their obligations. At that point, they would have to borrow. If, on the one hand, the cost of borrowing from the Fed is low relative to the rewards from lending to the public, then institutions are more likely to reduce their excess reserves, causing the size of the deposit multiplier to rise toward its maximum value. If, on the other hand, the discount rate is relatively high, then institutions are more likely to play it safe and, by keeping a larger cushion of excess reserves, reduce the size of the deposit multiplier and, therefore, the money supply and interest rates.

In short, an increase in the discount rate will cause the money supply to decrease whereas a decrease in the discount rate will encourage an expansion in the money supply.

Open-Market Operations

The primary tool of monetary policy is open-market operations. Open-market operations occur when the Fed (in practice, the Open Market Desk in the Federal Reserve Bank of New York) enters the bond market and buys or sells securities. These transactions may be with financial institutions or with individuals or firms outside the financial sector. In any case, the results are similar—a Fed purchase of bonds increases the quantity of reserves available to the financial sector, expanding the money supply and driving down interest rates whereas a Fed sale of bonds reduces the quantity of reserves and the money supply, and increases interest rates.

Consider what happens to the reserves of Bank A when the Fed approaches it with an offer to buy $5 million worth of its bond holdings.

The bonds held by Bank A are not part of its reserves, being neither vault cash nor deposits at the Fed. However, when the deal takes place, Bank A's balance sheet will show a $5 million reduction in bonds and a $5 million increase in deposits at the Fed, because the Fed will pay for the bonds by crediting Bank A's Fed account. The upshot of the transaction is that Bank A's reserves have increased by $5 million and it now has additional funds available to lend out. We would expect to see an increase in the money supply when the Fed buys bonds in the open market.

Learning Tip: As you work to master the intricacies of monetary policy, there are a couple of tricks that can help. The discount rate and reserve ratio move in the same direction—an expansion in the money supply can be achieved by reductions in either, for example. With respect to open-market operations, when the Fed (**B**)uys bonds the money supply grows (**B**)igger, and when the Fed (**S**)ells bonds the money supply grows (**S**)maller.

A Cautionary Comment: On the face of it, it looks as though monetary policy actions are neatly symmetrical, with equal purchases and sales of bonds by the Fed having equivalent but opposite impacts on reserves and, from there, the money supply and the level of interest rates. However, the Fed is more likely to be successful at contracting the money supply than it is at expanding it. This practical distinction in policy effectiveness is summed up in the phrase "You can't push a string" meaning that, although bankers may be compelled to reduce their lending, they can't be compelled to increase their lending. In an economy with a bleak outlook, in which the Fed might hope for greater extension of credit, bankers may quite simply balk.

A Further Caution: In addition to the forgoing comment, the self-interested actions of bankers may intensify the effects of business cycles. During a recession, for example, bankers, more cautious than usual, may lend less energetically and accumulate additional excess reserves, causing the deposit multiplier to decline. This decline will cause a decrease in the money supply and higher interest rates than would otherwise have been the case. As we will see next, rising interest rates will intensify the economic slowdown by discouraging private sector spending.

Finally, we should note that the Fed may conduct open-market operations by buying and selling securities denominated in foreign currencies.

Such transactions, which are not conducted directly with foreign government agencies but, rather, with private securities dealers, have an effect on the money supply similar to domestic transactions, but purchases and sales of foreign-denominated assets are likely to influence exchange rates. A Fed purchase of euro-denominated bonds, for example, will put pressure on the euro to strengthen relative to the dollar. In practice, this policy tool has fallen into disuse in the United States.

The Impact of Monetary Policy

Thinking back to our discussion of fiscal policy in Chapter 6, we know that an "expansionary" policy is one whose purpose is to encourage economic expansion—higher aggregate demand, more jobs—whereas the intent of a "contractionary" policy is to slow down an overheating economy's inflationary pressures. Where the fiscal policy transmission mechanism was short and direct—increase government spending to increase aggregate demand, for example—the monetary policy transmission mechanism has many more links and, therefore, more opportunities to fail.

The Monetary Policy Transmission Mechanism

We already have some of the links in hand. We know that the Fed can increase bank reserves by buying bonds from depository institutions (or from the private sector) or by reducing the discount rate. Also, we know that the size of the deposit multiplier can be influenced by changes in the required reserve ratio or the discount rate. The Fed's policy tools can affect the money supply and, therefore, the interest rate.

If, for example, the money supply is increased and the interest rate decreases, then the costs borne by businesses wishing to borrow financial capital in order to increase investment will be reduced, and previously unprofitable projects will become feasible. Lower borrowing costs increase investment. Moreover, reduced borrowing costs will encourage additional borrowing by households on "big-ticket" items such as cars, furniture, and household appliances. In short, a decrease in the interest rate will energize two major components of aggregate demand and will have an expansionary effect on the economy.

The monetary policy transmission mechanism for a policy using open-market operations is summarized in Figure 7.7.

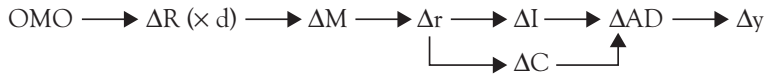

Figure 7.7 The monetary policy transmission mechanism

Let us suppose the Fed wishes the economy to expand and, as is typically the case, uses open-market operations, buying bonds. If the Fed buys bonds (OMO), then bank reserves will increase (ΔR) and, given the size of the deposit multiplier (d), the money supply will increase (ΔM). The increase in the money supply will depress interest rates (Δr)—the cost of borrowing. With reduced borrowing costs, businesses and households will borrow more heavily, reduce saving, and spend more. Investment and consumption spending will increase (ΔI, ΔC), driving up aggregate demand (ΔAD) and real GDP (Δy).

Cautions: This process of looks fairly cut and dried, but several cautions must be raised.

Caution 1: The Interest Sensitivity of Money Demand

One key link in the process is how sensitive demanders of money are to interest rate changes. If money demand is fairly sensitive to changes in the interest rate then, for a given change in the money supply, the change in the interest rate will be quite small, and the effectiveness of the policy will be stunted. This case is shown in Figure 7.8.

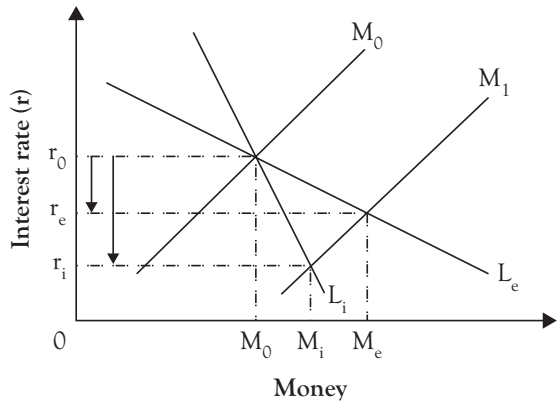

Figure 7.8 Interest sensitivity of money demand

Relatively, the more vigorously money demanders respond to a change in the interest rate, the flatter the money demand curve. In our diagram, the flatter money demand curve, L is more interest-sensitive than L_e. Given the increase in the money supply from M_0 to M_1 and with sensitive (or, in economists' terminology, *elastic*) money demand curve L_e, when the interest rate responds, it falls, but not by much (from r_0 to r_e) If, conversely, money demand is relatively insensitive *(inelastic)* to interest rate changes, then the money demand curve will be quite steep, as shown with inelastic demand curve L_i. Here, with the same increase in money supply, the decrease in the interest rate (from r_0 to r_i) is stronger. The stronger the interest-rate response, the more powerful the effect of a given policy action—monetary policy is more effective the less interest-sensitive is the demand for money.

Following the Great Recession, and particularly in the latter part of 2012, with interest rates driven down by Fed policy to historically low levels, there was renewed talk of a potential *liquidity trap* for the United States' economy and for others. A liquidity trap occurs if the money demand curve were to become horizontal. In such a situation, any changes in the money supply would become wholly ineffective. Money supply changes would have no effect on interest rates and traditional monetary policy would be rendered impotent. Once a theoretical curiosity, respected economists have argued that the Japanese economy wallowed in a liquidity trap during its "lost decade" at the end of the twentieth century.

THINK IT THROUGH: What could cause the money demand curve to become horizontal? Essentially what is happening is that any money that is pumped into the system is instantly snapped up and hoarded by the public. If interest rates are very low, then there is no strong advantage to holding interest-bearing assets that are less liquid and more risky than cash and, therefore, cash becomes the preferred asset.

As the Japanese discovered, for an economy captured in a liquidity trap, the standard monetary policy focus on manipulating short-term interest rates is ineffectual. The Japanese responded by shifting their monetary policy emphasis to *quantitative easing*, a path revisited by the

Fed in the aftermath of the Great Recession. We consider quantitative easing later in this chapter.

Caution 2: The Interest Sensitivity of Investment and Consumption

A further key, and controversial, link in the monetary policy transmission process is to do with the responsiveness of businesses and households to changes in short-term interest rates. The assumption of an expansionary policy is that, by cutting the cost of borrowing during an economic downturn, there will be an upswing in new investment projects (new businesses created and existing businesses expanded) and additional purchasing by households, and that the size of that upswing will be predictable. If the assumption is not valid, however, then the policy's effectiveness is jeopardized.

Caution 3: Time Lags

As with fiscal policy, monetary policy is hampered by lags between the emergence of a problem and its cure. While the recognition lag is the same as for fiscal policy, and the implementation lag is likely to be shorter, it has been argued, by Milton Friedman among others, that the response lag—the time between an interest rate change and its impact on the actions of businesspeople and households—may be "long and variable," adding to the general air of uncertainty involved in policy matters.

Caution 4: The Monetary Dampener

Finally, we must consider the effect of a feedback from the real sector of the economy to the financial sector. We will call this feedback the *monetary dampener* and, like the "dampeners" we have encountered in previous chapters (the price dampener, the tax-rate dampener), its presence reduces the size of the expenditure multiplier (m) and, from there, the effectiveness of both monetary and fiscal policy. It should be noted that, although the following example begins with an expansionary monetary policy action, the monetary dampener is present even in the absence of a policy action.

Given an economy thought to require a stimulus, let us suppose that the Fed buys bonds, boosts bank reserves, expands the money supply

from M_0 to M_1, and reduces the interest rate from r_0 to r_1 as shown in Figure 7.9.

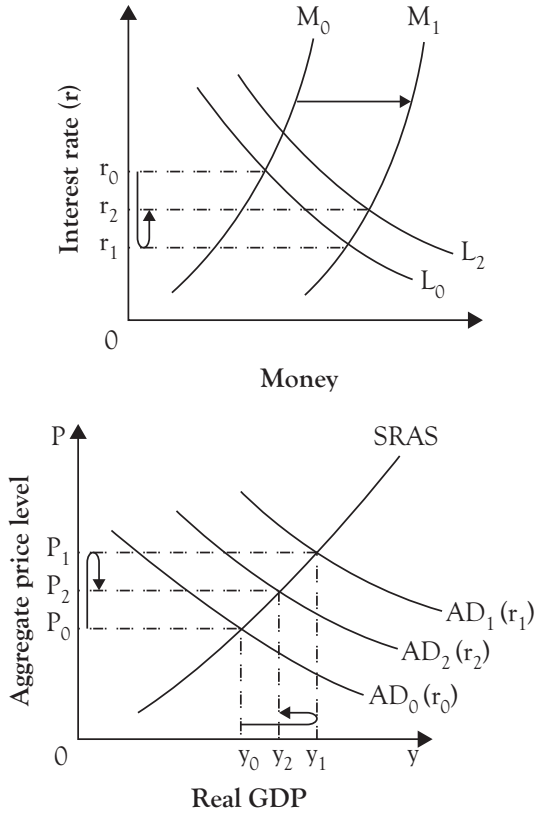

Figure 7.9 An expansionary monetary policy action

If all goes according to plan, investment and consumption spending increases, raising aggregate demand through the operation of the expenditure multiplier from AD_0 to AD_1. This is what we have seen in our past analysis but now we can consider the effect of the monetary dampener. As aggregate demand increases, both real GDP and the aggregate price level increase, to y_1 and P_1, respectively. As we have established, an increase in one or both of these variables will cause a rightward shift in the demand for money curve, as shown in Figure 7.9, with the movement from L_0 to L_2. This increase in money demand chokes off and then partially reverses the desired decrease in the interest

rate, which ends up at r_2. Consequently, the hoped-for expansion in investment and consumption is lessened and the rightward shift in aggregate demand is offset to some extent and aggregate demand comes to rest at AD_2. The monetary dampener reduces the size of the expenditure multiplier, acting as an automatic stabilizer that weakens the potency of policy actions.

THINK IT THROUGH: Verify the effect of the monetary dampener in the case where consumption spending suddenly increases because of an increase in optimism within the household sector. You should find that the equilibrium interest rate will increase, retarding the expansion in private spending.

A Defense of Monetary Policy

From the preceding paragraphs, you may have begun to query the effectiveness, or even the wisdom, of monetary policy. However, monetary policy can be enacted quickly and fine-tuned precisely, and, in practical terms, given the frequent political gridlock regarding the construction of fiscal policy, credit for the historically low inflation rates achieved over the past quarter century may be reasonably laid at the door of the Fed.

In addition, fiscal and monetary policies work through different channels, so the effectiveness of policy can be enhanced if a complementary blend of fiscal and monetary policy can be coordinated.

Policy Coordination An expansionary fiscal policy drives up interest rates. The more sensitive to interest rate changes the private sector is, the stronger is the crowding-out effect of fiscal policy and the less effective is such a policy, but, for the same reason, the *more* effective is monetary policy—the greater the interest-sensitivity of the private sector, the greater is the impact of a given change in the money supply. Accordingly, faced with an expansionary fiscal policy that, as a by-product, increases interest rates and produces crowding-out, the Fed can enhance the effectiveness of the fiscal policy by expanding the money supply through open-market purchases, thereby neutralizing the pressure on interest rates and forestalling the crowding-out effect.

In summary, through a coordinated effort, the Fed can heighten the potency of fiscal policy by "accommodating" actions.

The Great Recession and Recent History

During the first few years of the new century, there was a boom in housing prices and in the stock market. The Fed was unsuccessful in calming down the "irrational exuberance" of the markets and, with the addition of questionable financial products and practices, the economy crashed in 2007, resulting in bailouts of firms that were considered "too big to fail" and the introduction of the Troubled Asset Relief Program (TARP), the takeover of housing lenders Fannie Mae and Freddie Mac by the U.S. Treasury, and tightened restrictions in the financial sector through the passage of the Dodd–Frank Act of 2010. Let us consider the Fed's policy of *quantitative easing*.

Quantitative Easing

Quantitative easing (QE) was first introduced in Japan in the 1990s in the absence of feasible conventional monetary policy options. For similar reasons, the Fed initiated quantitative easing in 2010 because previous policy actions had driven short-term interest rates, such as the federal funds rate, close to zero and orthodox monetary policy actions were severely constrained. Quantitative easing involves the manipulation of longer-term interest rates.

There is, of course, not one single "interest rate" but rather a family of rates. Long-term rates, such as mortgage rates, are based on current short-term rates and expectations about how those short-term rates will change in the future and, in normal times, the Fed can influence long-term rates by acting on short-term rates. However, with short-term rates close to zero and expected to remain there, the Fed turned to quantitative easing to influence long-term rates and the overall economy. In practice, the new policy—buying mortgage-backed securities and decreasing the riskiness of banking sector balance sheets in an effort to increase the money supply—represented a turn away from targeting the interest rate and a rehabilitation of the importance of the *quantity* of money in the system.

In Chapter 4 (Volume I), we examined the *proportional form* of the Quantity Theory, which states that

$$\text{percentage change in M} + \text{percentage change in V} = \text{percentage change in P} + \text{percentage change in y}$$

In a liquidity trap, with individuals eagerly holding onto money balances, the velocity of circulation decreases but, with a stagnant economy, real GDP grows only slowly. Consequently, the Classical critique of quantitative easing is simple—quantitative easing runs the risk of igniting inflation as well as spending.

In addition, as we know from demand and supply analysis, the increase in the supply of a good can be expected to decrease its price. Similarly, an increase in the supply of dollars can be expected, other things remaining equal, to decrease the value of the dollar relative to other currencies—the exchange rate. A depreciation in the value of a nation's currency can have significant macroeconomic effects on variables such as exports and imports and it is to the international sector that we turn in Chapter 8.

Review: In this long and intricate chapter, we began by considering the meaning and functions of money, and then examined the ability of the central bank to manipulate the money supply and interest rates and, through that manipulation, the level of activity in the macroeconomy. We have found that monetary and fiscal policy acting in coordination can be more effective than if they operate in isolation.

CHAPTER 8

The International Sector

Trade and Finance

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

- Use comparative advantage to show how countries can gain from specialization and trade.
- Given a particular two-country, two-good situation, determine which country will trade which good and indicate the feasible range for the terms of trade.
- Given a particular two-country, two-good situation, and specific terms of trade, use consumption possibility frontiers to demonstrate that trade can be beneficial.
- Evaluate common arguments in favor of trade restrictions.
- Distinguish between a quota and a tariff.
- Use demand and supply analysis to outline the costs involved in the imposition of a tariff.
- Use demand and supply analysis to describe the determination of the international value of the dollar. Explain how each determinant plays a role in the process.
- Explain the reasoning behind the purchasing-power parity theory.
- Incorporate imports and exports into the ADAS model and explain how imports affect the size of the expenditure multiplier.
- Outline the effects of the exchange rate on the effectiveness of monetary and fiscal policy.

In 1981, the Japanese auto industry announced a voluntary limitation on the number of cars to be sent to the United States. This "voluntary export restraint," which was welcomed by the Reagan administration, lasted until 1994. In this chapter, we will analyze the economic effects of this apparently benevolent restriction on car sales by the Japanese.

Chapter Preview: In the present chapter, we will pull together several topics that we have met previously and integrate them into our model of the macroeconomy. In Chapter 1 (Volume I), we first encountered the production possibility frontier diagram and used it to depict several economic issues, including the benefits of trade and the sources of economic growth. In this chapter we will develop that early analysis to help us consider more fully the gains for trade and, in Chapter 9, we will turn to a deeper consideration of economic growth.

In Chapter 2 (Volume I), we used demand and supply analysis to examine consumer and producer surplus and the gains that flow from markets. We will employ this insight to lend further support to our conclusion that trade can be mutually beneficial. Demand and supply will also help us to discover how exchange rates are determined.

International Trade: The Principle of Mutually Beneficial Trade

In 1817, David Ricardo introduced the world to the Law of Comparative Advantage—first, as an explanation of the pattern of trade between nations and, second, as an argument in favor of trade liberalization, because Ricardo demonstrated that trade could be mutually beneficial. Respected economist Paul Samuelson has described the Law of Comparative Advantage as "the most beautiful idea in economics."

Since the trailblazing days of David Ricardo and Adam Smith, economists have generally expressed confidence in the ability of free and fair trade to provide the most advantageous outcome for the greatest number of individuals. It may seem perverse, therefore, that the practice of international trade has had such a long history of restrictions. In this section, we will first review and expand the model of trade we started in Chapter 1 (Volume I) and then consider arguments for and against free trade.

The Law of Comparative Advantage

Let us suppose that we have two countries—Germany and France—that produce two goods, barrels of beer (B) and wheels of cheese (C). Further, we will assume that there are no trade restrictions between the two countries, that transportation costs are insignificant, and that the two countries have production possibility frontiers that exhibit constant costs, that is, they are straight lines. The production possibility frontiers are shown in Figure 8.1.

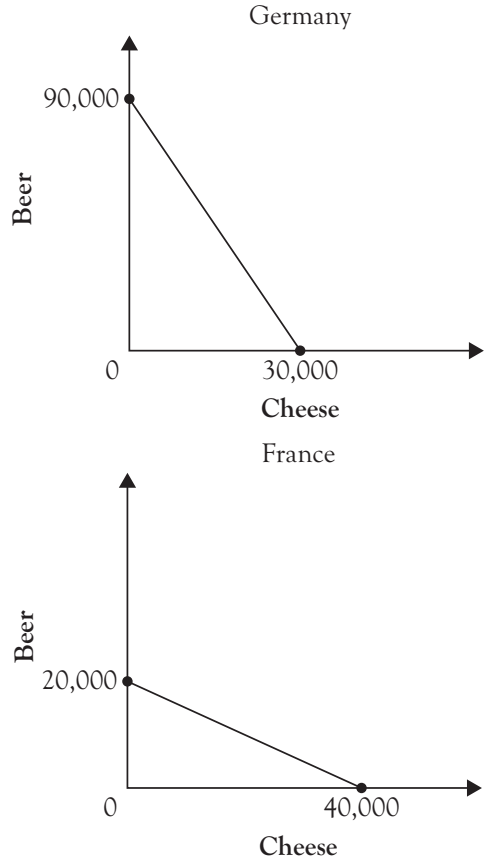

Figure 8.1 Production possibility frontiers for Germany and France

From Chapter 1 (Volume I), we know that the slope of a production possibility frontier depicts the opportunity cost of producing more of one good in terms of the other good. If the production possibility frontier is a

straight line, then because the slope of the frontier is constant, the opportunity cost is also constant. Our diagram shows that, at maximum, Germany can produce 90,000 barrels of beer (and no cheese) or 30,000 wheels of cheese (and no beer) whereas, at maximum, France can produce 20,000 barrels of beer (and no cheese) or 40,000 wheels of cheese (and no beer).

In our example, if Germany decides to specialize entirely in the production of cheese (producing 30,000 wheels of cheese), then the opportunity cost is the 90,000 barrels of beer that otherwise could have been produced—each wheel of cheese "costs" three barrels of beer. If France specializes entirely in the production of cheese (producing 40,000 wheels of cheese), then the opportunity cost is the 20,000 barrels of beer forgone. In France, therefore, each wheel of cheese "costs" a half of a barrel of beer. We can conclude that the opportunity cost of cheese is lower in France—France has a comparative cost advantage in the production of cheese.

Reversing the argument, if Germany specializes in beer production (producing 90,000 barrels), then the opportunity cost is the 30,000 wheels of cheese that otherwise could have been produced—each barrel of beer "costs" one-third of a wheel of cheese but, if France specializes entirely in beer production (producing 20,000 barrels), then the opportunity cost is the 40,000 wheels of cheese forgone. In France, each barrel of beer "costs" two wheels of cheese. The opportunity cost of beer is lower in Germany—Germany has a comparative cost advantage in the production of beer.

As we saw in Chapter 1, this is a general result—if the production possibility frontiers have differing slopes, then the opportunity costs must be different and each country must have a comparative cost advantage in the production of one of the two goods. It is not possible for either country to be cheaper at producing both goods. Only if the slopes of the frontiers are equal—meaning that the costs are equal—will no advantage exist.

Having established that Germany's comparative cost advantage is in beer production and France is in cheese production, Ricardo would recommend that each country play to its strength and specialize in the good in which it has the cost advantage. Each country should retain that portion of its domestic production that it desires and trade the remainder—its surplus—for the good in which it has the cost disadvantage. Following this strategy, Ricardo stated, ought to result in mutually beneficial trade. Can we prove Ricardo's assertion?

The Terms of Trade

To keep this simple, Ricardo assumed that traders barter, exchanging goods for goods. The **terms of trade** is the technical term for the "price" or the "barter rate of exchange," such as when one wheel of cheese is traded for two barrels of beer.

Let us suppose that the terms of trade are one wheel of cheese (C) trades for three barrels of beer (B), or 1C = 3B. Put differently, one barrel of beer trades for one-third of a wheel of cheese, or 1B = 1/3C. If so, then Germany, which specializes in beer production, cannot gain from trade. Why? Because Germany's cost of production of beer (one barrel of beer costs one-third of a wheel of cheese) is identical to its selling price, the terms of trade. If the "cost" and the "price" are the same—no gain!

France, however, would gain from trade. France's opportunity cost of producing a wheel of cheese is one-half of a barrel of beer and it can exchange each unit of cheese for three barrels of beer. Because it can produce cheese at a "cost" that is lower than the "price" at which it can sell its cheese, France gains from trade.

In this situation (1C = 3B), because France would gain from trade and Germany wouldn't lose, trade should proceed.

Now, suppose that the terms of trade are one wheel of cheese (C) trades for one-half of a barrel of beer (B), or 1C = 1/2B. Put differently, one barrel of beer trades for two wheels of cheese, or 1B = 2C. Here, Germany will gain from trade because the opportunity cost of its specialty, beer, is less than the terms of trade, but France would neither gain nor lose, because the opportunity cost of cheese production in France is identical to the terms of trade.

In such a situation, (1C = 1/2B), because Germany would gain from trade and France wouldn't lose, trade should proceed.

The Limits to the Terms of Trade

We have identified the *limits to the terms of trade*. These limits are the values for the terms of trade at which one country will gain from trade while the other will not lose. In our example, one limit is 1C = 3B (only France gains) and the other limit is 1C = 1/2B (only Germany gains). As we will see, if the terms of trade stray beyond these limits, then trade will break down but, before examining that point, let us consider what determines the limits to the terms of trade.

France specializes in cheese and its opportunity cost for a wheel of cheese is half a barrel of beer (1C costs 1/2B), whereas Germany specializes in beer and the opportunity cost there of a barrel of beer is one-third of a wheel of cheese or, put differently, the German opportunity cost of a wheel of cheese is three barrels of beer (1C costs 3B). The limits to the terms of trade are determined by the respective opportunity costs in the two countries.

Going beyond the Limits to the Terms of Trade

What if, somehow, the terms of trade moved beyond either limit? What would happen then?

Suppose that the price of cheese rose from three barrels of beer (1C = 3B) to four barrels of beer (1C = 4B) or, in order words the price of each barrel of beer fell to one-quarter of a wheel of cheese (1B = 1/4C). In this situation, with cheese highly priced, the French would be quite happy to produce cheese. The beer-producing Germans, however, would be less content because, if they produced beer (at a cost of one-third of a wheel of cheese) they would have to sell it for a lower price (one-quarter of a wheel of cheese). They would not produce beer. As there are only two goods, if the Germans do not produce beer then they must produce cheese. This is feasible, in the sense that the German cost of cheese production is three barrels of beer, but the international price of cheese is higher, at four barrels of beer. Germany should produce cheese.

Trade, therefore, breaks down! With both countries bringing only cheese to the market, there is nothing to trade it for. If there were more than two countries and one was sufficiently low cost in beer production (the Czech Republic, perhaps), then trade could continue but, with only two countries, the basis for trade is removed.

THINK IT THROUGH: Using the other limit (1C = 1/2B) for reference, determine a value for the terms of trade that lies beyond that limit, such as 1C = 1/5B. Verify for yourself that, in this case, both France and Germany will find it preferable to produce beer and that trade between them will cease.

A mechanism exists to restore trade. If both France and Germany produce only cheese, then it is likely that consumers will weary of their endless diet of cheese (the demand for cheese will decrease, causing a surplus) while there will be a heightened desire for beer (the demand for beer will increase, causing a shortage). Relatively, the price of cheese will decrease and the price of beer will increase—the terms of trade will move in favor of beer. We should expect that, typically, the terms of trade will lie at one or other of the limits to the terms of trade or, more likely, at a value between the limits.

A Mutually Beneficial Value for the Terms of Trade

If the terms of trade are established somewhere between the limits to the terms of trade, for example, with one cheese trading for one beer (1C = 1B), then we can demonstrate that trade will be mutually beneficial.

Consider cheese-producing France. The opportunity cost to France of producing a wheel of cheese is one-half of a barrel of beer (that's the amount of beer France gives up in order to produce its cheese). France can trade the cheese for one barrel of beer. By trading, France has gained a barrel of beer at a cost of one-half of a barrel of beer—France wins!

The same conclusion is true for beer-producing Germany. The opportunity cost to Germany of producing a barrel of beer is one-third of a wheel of cheese—the amount of cheese Germany forgoes in order to produce its beer. Germany can trade its barrel of beer for one wheel of cheese. By trading, Germany has gained a wheel of cheese by giving up one-third of a wheel of cheese—Germany wins!

In short, any terms of trade value that lies *between* the limits to the terms of trade will produce mutually beneficial trade, just as Ricardo predicted. The closer to one limit the actual terms lie, the greater the advantage to one trading partner and the less to the other, but the underlying proposition still holds—both parties gain by specializing and trading according to comparative advantage. Table 8.1 summarizes our discussion on the terms of trade and the gains from trade.

Table 8.1 Terms of trade and the gains from trade

Terms of trade	Values for terms of trade	Results
Beyond the limit to the terms of trade (trade breaks down)	$1C > 3B$ $1B < 1/3C$	France produces cheese. Germany produces cheese.
At one limit to the terms of trade (one country gains from trade)	$1C = 3B$ $1B = 1/3C$	France gains from producing cheese. Germany breaks even.
Between the limits to the terms of trade (mutually beneficial trade)	$1C = 1B$ $1B = 1C$	France gains from producing cheese. Germany gains from producing beer.
At one limit to the terms of trade (one country gains from trade)	$1C = 1/2B$ $1B = 2C$	France breaks even. Germany gains from producing beer.
Beyond the limit to the terms of trade (trade breaks down)	$1C < 1/2B$ $1B > 2C$	France produces beer. Germany produces beer.

THINK IT THROUGH: Two countries with similar costs have little scope for advantageous trade but the gains from trade are likely to be greater for countries the more dissimilar are their opportunity costs.

The Consumption Possibility Frontier

The discussion in the previous section contains a fair amount of math but it is possible to reach the same conclusion, that both parties gain by specialization and trade, by using a graphical method—the consumption possibility frontier.

A *production* possibility frontier shows how much it is possible for a country to produce, given its current resources and technology. In an entirely analogous way, a **consumption possibility frontier** (CPF) shows how much it is possible for a country to consume, given its current resources and technology. For a country that does not indulge in trade, its consumption possibility frontier and its production possibility frontier are identical—alone on his island, Robinson Crusoe can consume no more than he can produce.

Let us use the value between the limits to the terms of trade (1C = 1B) that we have shown to yield mutually beneficial results for France and Germany, and recast the analysis in terms of CPFs.

For Germany, specializing in the production of beer, one consumption option is to produce 90,000 barrels of beer, not trade, and consume them all. In that case, Germany's consumption bundle would be 90,000 barrels of beer and no cheese. This is point A in Figure 8.2.

A second alternative is to produce 90,000 barrels of beer and trade them all for cheese, at a rate of one beer for one cheese, allowing Germans to consume 90,000 wheels of cheese and no beer. This is point B in Figure 8.2.

A third alternative is to produce the 90,000 barrels of beer and keep 45,000 barrels and trade the other 45,000 barrels for cheese, at a rate of one beer for one cheese, allowing Germans to consume 45,000 barrels of beer and 45,000 wheels of cheese. This is point C in Figure 8.2.

In this way, we can build up all of Germany's possible consumption alternatives. Except for "no trade" point A, which lies on the production possibility frontier, trade expands Germany's consumption possibilities beyond what it can achieve without trade. Germany gains from trade.

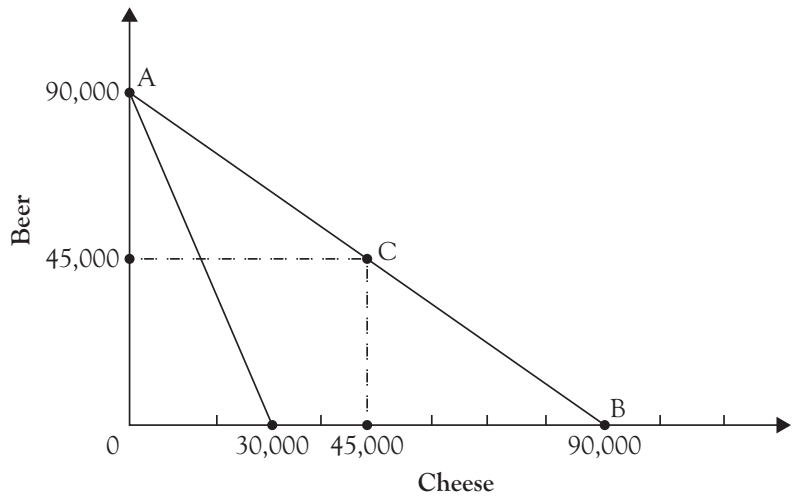

Figure 8.2 Germany's consumption possibility frontier

The CPF starts at point A, depicting the situation where Germany is specializing in beer production. The slope of the CPF is determined by the terms of trade. If the terms of trade move in Germany's favor, with a barrel of beer exchanging for a greater amount of cheese, then the frontier will pivot outward from point A, with point B representing a growing quantity of cheese. If, however, the terms of trade move against Germany, then the frontier will pivot inwards from point A, with point B representing a dwindling quantity of cheese. If the terms were such that at one barrel of beer exchanged for only one-third of a wheel of cheese, then Germany's CPF would coincide with its production possibility frontier—there would be no gains from trade. Why? Because 1B = 1/3C is the limit to the terms of trade at which Germany does not gain. Check Table 8.1 to verify this conclusion.

We can construct France's CPF in a similar fashion, as shown in Figure 8.3. Note that point B is the endpoint at which the French consumption and production possibility frontiers meet—this is because France specializes in cheese production. Further, observe that the CPFs have identical slopes—they *must* have, because the slope of the CPF is determined by the terms of trade that are shared by the two countries.

"But," you may object, "there's a problem here. If this is a two-country, two-good world, the analysis suggests that Germany can consume 90,000 wheels of cheese at point B. But, if only France produces cheese, and it can produce a maximum of 40,000 wheels of cheese, how can Germany get 90,000?"

Clearly, Germany can't get 90,000 wheels of cheese. If we included a third (cheese-producing) country, then the problem might be solved but, having set up our model as a two-country world, we must offer a more satisfactory answer. First, given that it is improbable that Germany will press for the maximum possible quantity of cheese (because the nation is likely to desire some beer as well), we could suggest that this portion of the German CPF is unlikely to come into play. But, because it could come into play, we must consider what would then happen.

A high demand for cheese coupled with an insufficient supply will cause the price of cheese (in terms of beer) to increase—in other words, the terms of trade will move in favor of the French. The German CPF will pivot inwards—90,000 barrels of beer no longer will be able to be traded for 90,000 wheels of cheese. At the same time, the 90,000 barrels of beer that the Germans wish to trade are being met by a French demand

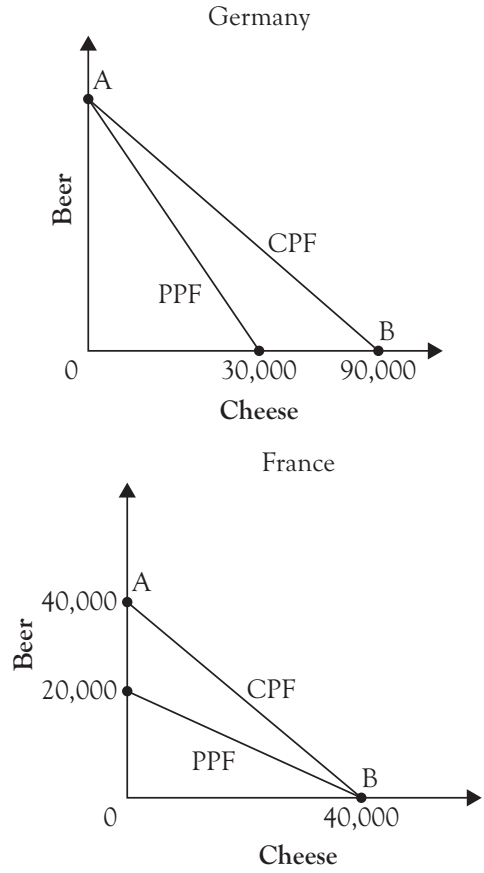

Figure 8.3 Gains from trade demonstrated using consumption possibility frontiers

for only 40,000 barrels. The surplus of beer will cause the price of beer to decrease (in terms of cheese). This effect is merely the flip side of the increase in the price of cheese.

The upshot is that there is a mechanism present in the market that will adjust the terms of trade to an appropriate rate of exchange in order to remove shortages and surpluses. As long as the terms of trade lie between the limits to the terms of trade, the German and French CPFs will lie beyond their respective production possibility frontiers. Our basic point remains: Levels of consumption can be achieved with trade that cannot be achieved without trade—trade is mutually beneficial.

Arguments Made for Protectionism

From the preceding discussion, there would seem to be scant reason for opposing free trade but Ricardo (and Adam Smith before him) developed such strong arguments in favor of unrestricted trade precisely because there were powerful opponents of free trade. Protectionist arguments persist to this day, despite pressure from the General Agreement on Trade and Tariffs (GATT) in 1947, and the establishment, in 1995, of the World Trade Organization (WTO), which has become the world's main forum for promoting and facilitating freer trade among nations.

Are We on the Production Possibility Frontier?: First, a technical point. We must note that our conclusion—that trade guided by comparative advantage can be beneficial—depends on the assumption that each economy has full employment, because our opportunity cost calculation is determined by the slope of the production possibility frontier. If that full-employment assumption is not true—and in the short run it quite frequently is not—then the economy must be operating inside the frontier and the argument for free trade on the basis for comparative advantage evaporates because our opportunity cost calculations are valid only along the frontier itself. A nation struggling through a recession might still find it to be in its own best interests to restrict imports and create homegrown jobs. It is certainly true that, when nations experience recessions, they tend to play the protectionist card.

In Chapter 5, we found that each economy has a "self-correcting" mechanism that will cause it to operate at full employment in the long run. However, given that the economy is, or tends to be, fully employed in the long run and that, on that basis, free trade is advantageous, there endure several deeply entrenched arguments supporting trade restrictions, with the general argument in favor of protection resting on the observation that efficient foreign competition will result in job loss for domestic workers, lost production, and national disruption. Particular arguments for protection from foreign competition include the "infant-industry" argument, appeals regarding national security, and the "cheap foreign labor" complaint. Some of these arguments are simply false, and others are valid but misused. Let us evaluate each of these protectionist justifications in turn.

"Infant-Industry" Argument: This justification for trade restrictions claims that recently established industries may not be large enough to benefit from economies of scale and, hence, will temporarily be at a cost disadvantage relative to larger foreign competitors. Protection should be offered in order to allow such industries to achieve their full potential.

On the face of it, this argument has some merit but only if private venture capital is unavailable for some reason because if, in the long term, the industry will be profitable (which, after all, is the premise of the argument) then private resources will be attracted through capital markets. However, if any form of intervention is justified, government loans are more appropriate than trade restrictions.

National Security: In our two-good, two-country model, if one good is "guns" and the other is "butter," then an argument may be advanced that each country, guided by prudence, ought to produce some guns. Again, this view has some merit, the difficulty being where to draw the line between production that is important for national security and production that is not.

THINK IT THROUGH: Suppose the government announces that it will protect only goods that are essential for national defense. Choose a locally produced good or, if you prefer, chewing gum. Can you devise reasons to support the chosen good's claim for protection? The more creative your arguments, the more difficult they will be to refute.

"Cheap Foreign Labor": This is a frequent but flawed argument. First, wages reflect productivity so, if a nation's workers receive relatively low wages, then it is because their productivity is comparatively low. American workers receive higher wages because they are more productive, perhaps through superior training, a greater quantity and quality of capital, a stronger work ethic, or better health. In terms of GDP per hour worked, American workers are almost three times more productive than Mexican workers, for instance.

Second, trade is based on *comparative* advantage. Even if American workers are more productive and more highly paid across the board, as

long as there are industries where the superiority is less marked, then specialization and trade will be beneficial. One could claim that the reason that the United States is shedding textiles jobs is because American workers in hi-tech industries are so very productive!

THINK IT THROUGH: Nations often accuse each other of unfair trade practices as a justification for some form of retaliation in order to "level the playing field." Such practices include predatory dumping (flooding a market with underpriced goods with the intent of destroying the domestic industry) and currency manipulation (where an exporting nation reduces the value of its currency and, therefore, increases the value of the currency of the importing nation). Although these practices can disrupt the pattern of trade, the appropriate response nowadays is not to retaliate with protectionist policies, but to place the matter before the World Trade Organization, the body set up to arbitrate such international trade disputes.

Demand and Supply Analysis of Trade Benefits and Restrictions

In Chapter 2 (Volume I), we introduced the concepts of consumer and producer surplus within a demand and supply context. We will now use this insight to analyze gains from trade.

Comment: You may wish to review the section in Chapter 2, "A New Way to Look at Demand and Supply," before proceeding.

The Market for Oil

Figure 8.4 shows the domestic market for oil in the United States.

Without imports, let us suppose that the equilibrium price of gasoline (P_{US}) is $7.00 per gallon. The equilibrium quantity (Q_{US}) is 300 million barrels per day. The consumer surplus—the difference between the market price and the demand (or marginal benefit) curve—is the triangle $P_{US}XE$. The producer surplus—the difference between the market price and the supply (or marginal cost) curve—is the triangle $P_{US}YE$. The total economic surplus for the economy is the combined area, XYE. (This is exactly the analysis we conducted in Chapter 2 with Figure 2.25.)

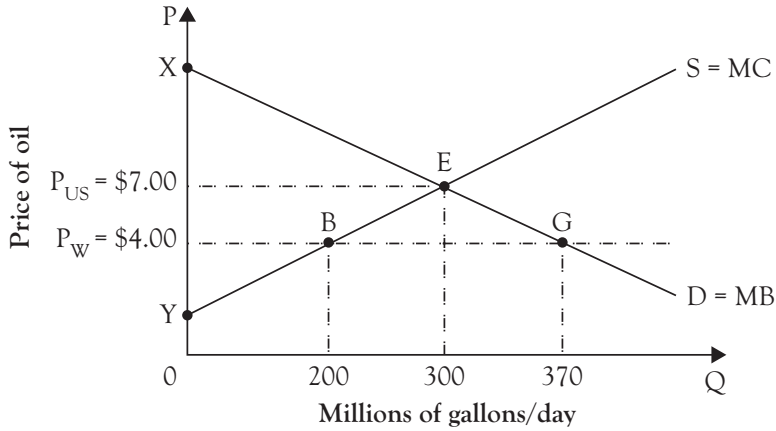

Figure 8.4 The market for oil

Assume that the world price of gasoline (P_W) is $4.00 per gallon. If the domestic market is opened up to permit imported gasoline, then the domestic price of gasoline will be driven down to the global price level. Domestic production will decrease from 300 million gallons to 200 million gallons and quantity demanded will increase to 370 million gallons—170 million gallons will be imported.

How will this change affect the economy's total economic surplus? Producer surplus will shrink to P_WYB—American oil producers will certainly oppose the change—but consumer surplus will expand to P_WXG. The area, BEG, represents the net gain for the economy. Although some individuals (US oil producers) lose, trade is generally beneficial.

Immigration

Before we move on, let us consider the American labor market, as shown in Figure 8.5.

In the absence of foreign labor, let us suppose that the equilibrium salary for low-skilled workers (P_{US}) is $10.00 per hour. The equilibrium quantity of workers employed (Q_{US}) is 60 million. The consumer surplus—the difference between the market price and the demand (or marginal benefit) curve—is the triangle $P_{US}XE$. This requires a little thought—the demand curve is the demand for labor by *employers,* so the triangle $P_{US}XE$ is the surplus for employers. The producer surplus—the difference

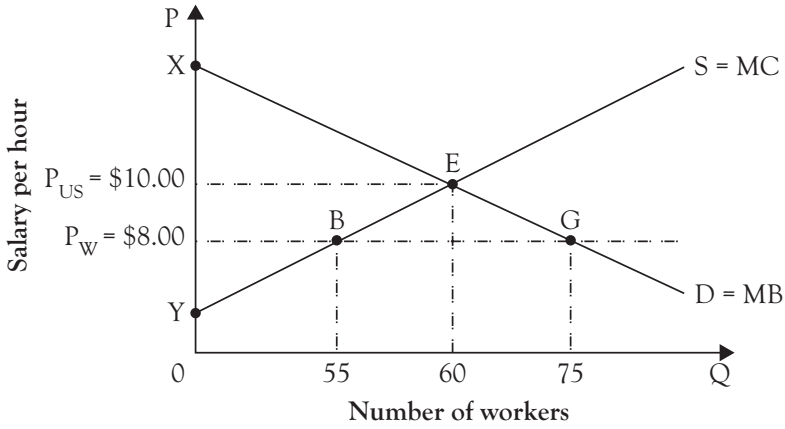

Figure 8.5 The market for labor

between the market price and the supply (or marginal cost) curve—is the triangle P_{US}YE. Again, we must be careful, because the supply curve represents the supply of labor by homegrown *American workers* and the area P_{US}YE is the benefit accruing to them when foreign labor is excluded. The total economic surplus for the economy is the combined area, XYE, as in the previous example.

Assuming that the hourly wage (P_W) is only $8.00 for workers employed outside the United States, there is an incentive for 20 million foreign workers to enter the American labor market. The domestic wage rate will be driven down to $8.00. Producer surplus (for American workers) will decrease to P_WYB—American workers will certainly oppose the liberalized immigration as a threat to their jobs and standard of living—but consumer surplus (for employers) will expand to P_WXG. The net gain for the economy is represented by the area, BEG. Although some individuals (US workers) lose, liberalized labor markets are generally beneficial.

Voluntary Export Restraint

Since the 1994 Uruguay Round of trade negotiations, voluntary restraints on exports have been discouraged, in order to foster freer trade between nations and to prevent deadweight losses for importing countries. As mentioned in our chapter opener, one famous example, initially welcomed by the United States, was the restriction Japanese

automakers placed on their car exports to the United States in the early 1980s. Consider Figure 8.6.

The diagram shows the American demand and supply situation for imported Japanese cars in the early 1980s. At the time, gas prices were high and small, reliable, compact cars were an attractive purchase. Because American carmakers were slow to respond, Japanese companies found an enthusiastic market with, perhaps, three million cars traded at a price, P*. The consumer surplus for American purchasers of Japanese cars is shown by the area P*XE; producer surplus for Japanese carmakers is P*YE, and the total economic surplus is XYE.

Fearing punitive import taxes (tariffs), the Japanese voluntarily restricted shipments of cars to 1.68 million—in effect causing the supply curve to become vertical at that quantity, as shown by S_{VER}. The price of Japanese imports rose to P_{VER}, by some estimates a 15 percent price hike. Japanese producer surplus increased to P_{VER}ABY but American car buyers lost—their surplus declined to P_{VER}XA. The major winner, however, was the domestic car industry, which, because of the reduced competition, was able to retain high prices while gaining additional customers. Note that the competitive need for American carmakers to innovate was dulled by the Japanese action.

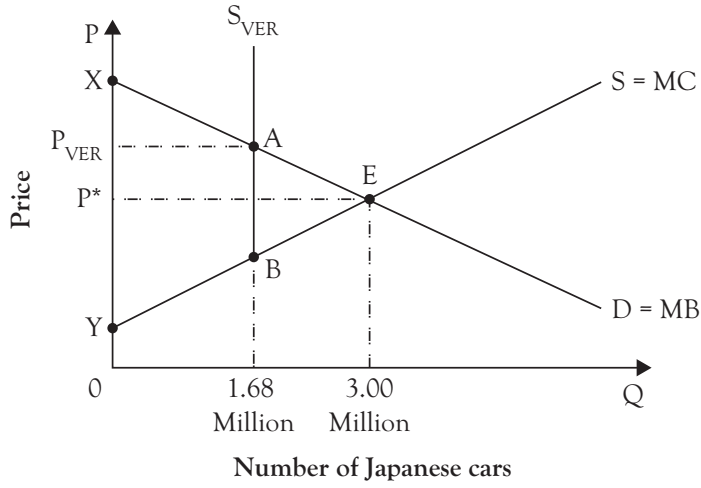

Figure 8.6 Japanese voluntary export restraint

A **quota**, a maximum import limit imposed by an economy, functions in a similar fashion to a voluntary export restraint, and similar welfare-reducing distortions occur, but with the additional threat of retaliation.

Tariffs

So far in this chapter we have employed a variety of techniques to present the argument that free trade offers benefits to economies and we have evaluated some of the frequent protectionist arguments against free trade. It is true that barriers to trade have been reduced over the years, but restrictions still survive and the most prominent is the tariff. A **tariff** is a tax imposed on imports. It has the effect of raising the price of the imported good, blunting any price advantage the import may have over domestic substitutes. It also has the attractive feature—for the government that imposes it—of generating tax revenues while preserving the jobs of voters. Consider Figure 8.7, which depicts the market for steel in the United States.

Because the world price (P_W) is lower than the domestic price, the United States is producing 70 million tons (Q_B), demanding 130 million tons (Q_G) and, therefore, importing 60 million tons ($Q_G - Q_B$). The domestic producer surplus is P_WYB and the consumer surplus is P_WXG.

In 2002, the Bush administration imposed a temporary tariff on steel, ranging from 8 to 30 percent. Canada and Mexico, as members of NAFTA, were exempt, as were some other steel-producing countries. The reason given for imposing the tariff was protection against an alleged detrimental surge of foreign-produced steel that had bankrupted more than 30 domestic producers. Similarly, in 2018, the Trump administration imposed a 25 percent tariff on imported steel. Again, some countries were exempt and, once more, the justification was that under-priced foreign steel had jeopardized domestic production. To simplify matters, we will assume a single tariff (T) that raises the price of steel in the American market to P_T.

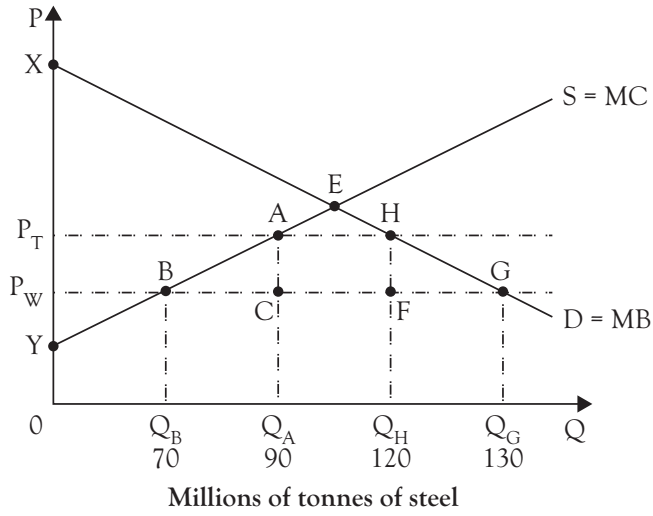

Figure 8.7 The effects of a tariff

As a consequence, the quantity supplied by domestic producers increases from Q_B to Q_A, a gain of 20 million tons—the producer surplus increases by P_WP_TAB. The quantity demanded by domestic purchasers decreases from Q_G to Q_H, a loss of 10 million tons—the consumer surplus decreases by P_WP_THG.

It would seem that the imposition of the tariff has caused a deadweight loss of BAHG, but this conclusion fails to include the third player—the government. Although imports have decreased, they still amount to 30 million tons ($Q_H - Q_A$) and the government receives tax revenue amounting to CAHF. The deadweight loss caused by the tariff is shown by the two remaining triangles, namely ABC and FGH.

THINK IT THROUGH: It is worth noting that the tariff revenues taken by the government, represented by the area CAHF, are best thought of as a redistribution toward the government and away from the consumers of imported goods, not as a tax that is being levied on and paid for by foreign producers. When Washington imposes a tariff, it is the consumer surplus of American citizens that is being reduced.

Comment: In the real-world case from 2002, the WTO found that no surge in imports had occurred and that the tariffs were therefore illegal. The European Union threatened retaliatory measures and the WTO authorized a two billion dollar sanction. The tariffs were removed. At the time of writing, the Trump tariffs remain in force.

Summary

The main point to be taken from the preceding discussion is that unrestricted trade is allocatively efficient. Trade restrictions engender deadweight losses because scarce resources are misdirected to inefficient lines of activity. Although trade may result in temporary unemployment in particular sectors, and that unemployment might prove socially disruptive, the preferred response ought to be to encourage displaced resources to seek out those activities in which they hold the comparative advantage.

International Finance: Exchange Rates and the Value of the Dollar

In Chapter 2, we began an analysis of the international currency market. There, we found that the dollar can increase (appreciate) or decrease (depreciate) in value, depending on market conditions.

A Brief Review of What We Learned in Chapter 2 (Volume I)

The international demand for dollars is a *derived demand*—dollars are demanded, not for themselves, but for what they can buy—American exports. Other things remaining equal, an appreciation in the value of the dollar leads to a decrease in the quantity demanded of dollars (by foreigners) because, from the viewpoint of foreign buyers—as the dollar strengthens and the foreign currency correspondingly weakens—American goods become more expensive. With American goods less attractive, there is a decrease in the quantity demanded of dollars needed to buy those goods.

The quantity of dollars supplied (by Americans) is also affected by the exchange rate. As the dollar appreciates in value (and the foreign currency depreciates), foreign goods become easier for Americans to buy—the

strong dollar stretches further—and to buy the increased quantity of such goods, which require payment in the local currency, more dollars must be supplied. With foreign goods more attractive, there is an increase in the quantity supplied of the dollars needed to buy the foreign currency in which those goods are price-tagged.

THINK IT THROUGH: A large part of these currency exchanges is invisible to American purchasers because the dollar is such a well-known and generally acceptable currency. Certainly, foreign companies that have a healthy trade with the United States are frequently willing to accept payment in dollars and then, with a fee added on, make the currency conversion themselves. Companies, such as Amazon and PayPal, allow buyers to designate their preferred currency for international transactions. Credit card purchases in Paris, Moscow, or Shanghai convert local currency purchases into dollars and report them as such on the next statement. But, although we may be barely aware of international exchange activities, those transactions still continue.

In Chapter 2, we concluded that the international market for dollars can be represented as shown in Figure 2.22 (reproduced here as Figure 8.8), with the dollar's value increasing if either the demand for dollars increased (because of an increased foreign demand for American exports) or if the supply of dollars decreased (because of a decreased American demand for foreign goods).

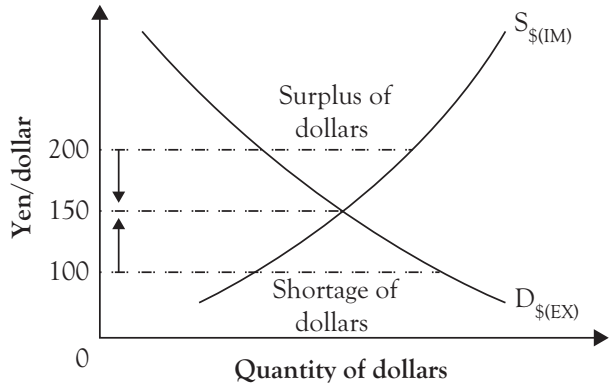

Figure 8.8 Equilibrium in the international market for dollars

The flow of exports and imports is not the only factor influencing the international value of the dollar, however. We are now in a position to consider more fully the factors that determine the exchange rate.

Determinants of the Exchange Rate

We can identify two major factors that can influence the international price of the dollar, over and above the levels of exports and imports—relative international interest rates, and relative international price levels. In general, relative interest rate changes have a fairly rapid impact on exchange rates as financial capital flows swiftly across international borders, whereas changes in international price levels operate more slowly.

Relative International Interest Rates. Diversification—not keeping all one's eggs in the same basket—is a basic dictum of investors. To spread the risk, an investor should hold a variety of assets, such as U.S. Treasury bonds and bonds issued by the Bank of Japan. Each bond pays an interest rate—let us suppose 2 percent for the Treasury security and 5 percent for the Japanese bond. On any given day, both American investors and Japanese investors will be purchasing Treasury bonds and Japanese bonds. A Japanese wishing to buy a U.S. bond requires dollars and an American wishing to buy a Japanese financial instrument requires yen. Investors may be willing to accept a lower interest rate on the Treasury bond because of the desire to diversify or, perhaps, because U.S. bonds are perceived to hold a lower risk than Japanese bonds.

Let us suppose that international flows of funds between the two countries to buy bonds have stabilized but now the interest rate of Treasury bonds increases from 2 percent to 3 percent. U.S. bonds are relatively more attractive (and Japanese bonds are relatively less attractive) than formerly and, therefore, the demand for U.S. bonds will increase but the demand for Japanese bonds will decrease.

As Japanese demand for U.S. bonds increases, the demand for dollars to buy those bonds will also increase—an increase in the relative interest rate on U.S. securities causes an appreciation in the value of the dollar. Simultaneously, as American demand for Japanese securities is reduced,

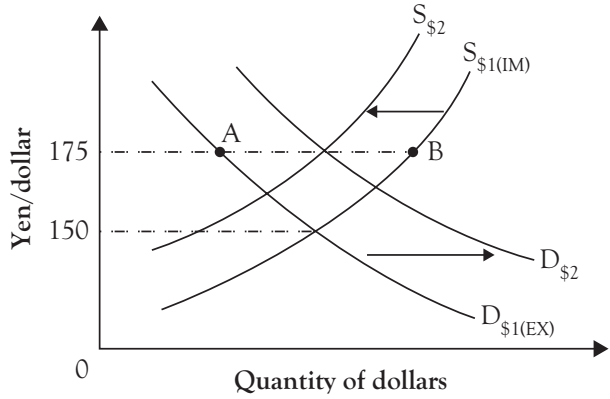

Figure 8.9 The effects of an increase in U.S. interest rates

the demand for yen to buy those securities is also reduced and—the other side of the same transaction—the supply of dollars to buy the yen is reduced, also causing an appreciation in the value of the dollar.

An increase in the relative interest rate of U.S. bonds increases the demand for dollars from $D_{\$1(EX)}$ to $D_{\$2}$, and decreases the supply of dollars from $S_{\$1(IM)}$ to $S_{\$2}$, causing a dollar appreciation, as shown in Figure 8.9.

Here is the solution to the trade conundrum that was broached earlier—how is it possible for the United States to run a persistent balance of trade deficit? The demand curve $D_{\$1(EX)}$ represents the demand for American exports whereas the supply curve $S_{\$1(IM)}$ represents the demand for American imports. At the new exchange rate ($1 equals 175 yen), imports exceed exports—there is a trade deficit, shown by the line segment AB. One reason we have been able to sustain our trade deficit is because foreign lenders have been willing to buy our IOUs (bonds).

THINK IT THROUGH: Earlier, in Chapter 2, we developed a rule of thumb regarding shifts in demand and supply curves, namely, "One factor shifts one curve and it shifts it only one time." In the current case, this rule is infringed because one factor—a change in an interest rate—has caused *both* curves to shift position. This is quite unusual in most markets but, as we will see, is to be expected in exchange markets.

Relative International Price Levels: One of the oldest of economic laws is the "law of one price," or **Purchasing-Power Parity**. This law states that the price of a good, such as a sack of rice, should be roughly the same in different countries. Transportation costs or sales taxes may interfere but, if such costs are negligible, then competitive forces should equalize prices. If rice is cheaper in North Dakota than in South Dakota, then entrepreneurs will have an incentive to buy low in North Dakota and sell high in South Dakota. The increased demand in North Dakota and the increased supply in South Dakota will force prices closer.

If the American price level increases relative to that of Japan, then Japanese goods will become more attractive to American purchasers whereas Japanese purchasers will become less keen on buying American-produced goods. The American demand for imports will increase, causing an increase in the demand for yen and an increase in the supply of dollars. However, the Japanese demand for U.S. exports will decrease, causing a decrease in the demand for dollars. Working together, both factors will result in a depreciation in the value of the dollar.

Put differently, if the United States' inflation rate increases, then we should expect the dollar to weaken.

The purchasing-power parity theory argues that changes in relative price levels drive the exchange rate. An economy with a rapidly rising aggregate price level (i.e., a relatively high inflation rate) should expect to see its currency depreciate in value. And, in the long run, what causes the aggregate price level to increase? Recalling our discussion of the Quantity Theory in Chapter 4 (Volume I)—overenthusiastic expansions in the money supply! Purchasing-power parity contends that an economy whose currency is losing value over time is experiencing this result because its aggregate price level is rising relative to those of its trade partners. According to purchasing-power parity, if Canada and the United States traded only with each other, and if the Canadian price level were twice as high as that of the United States, then the Canadian dollar would be worth half of an American dollar. If Canadian price levels rose, then the Canadian dollar would depreciate in value.

THINK IT THROUGH: What would happen if carpets were priced at "600 (Canadian) dollars" on the Canadian side of the border (in Fort Erie) but at "300 (U.S.) dollars" on the American side of the border (in Buffalo), and each American dollar was exchangeable for one Canadian dollar? Canadians would drive to Buffalo to buy carpets, exchanging 300 Canadian dollars for 300 American dollars. The demand for American dollars would increase, causing the American dollar to appreciate in value. This process would continue until the incentive for Canadians to travel to Buffalo disappeared—when the American dollar became twice the value of its Canadian counterpart.

There are some flaws in the theory, however, when applied in the real world. Driving to another country to buy a carpet may be inconvenient, time consuming, and expensive. Products may not be identical and local taxes may be a complication. In addition, the economy's overall price level reflects the price of services as well as goods, but services (haircuts, for example) are difficult to "export." For these reasons, the law of one price should be seen as a description of a general tendency for the behavior of exchange rates rather than a hard and fast rule.

Before continuing, it is worth reiterating that a "weak" dollar, just like a "strong" dollar, is a mixed blessing—good news for some, bad news for others.

International Trade and the ADAS Model

We are now ready to add the foreign sector into our macroeconomic model. **Net exports**, the difference between a country's exports and its imports (EX – IM), are included in aggregate demand. Our complete formula is

$$AD = C + I + G + (EX - IM)$$

An increase in exports or a decrease in imports will shift the aggregate demand curve to the right, causing the economy to expand and creating jobs. Given the exchange rate, the level of demand for exports is

determined by foreign factors. Typically, as our trading partners prosper, our exports grow—a recession in Europe, or a slowdown in Japan, is bad news for American exporters.

Similarly, the volume of our imports is largely determined by our own domestic conditions. As our income increases and we prosper, we import more. In other words, there is a marginal propensity to import. The *marginal propensity to import* (MPM) is the fraction of any additional income that is spent on imported final goods.

The Marginal Propensity to Import and the Expenditure Multiplier: Like the marginal propensity to save (MPS) and the marginal tax rate (MTR), the marginal propensity to import is a leakage of spending power from the circular "earnings/spending" process that we first encountered in Chapter 3 (Volume I) and have subsequently refined. In those earlier chapters, we found that the size of the expenditure multiplier was affected by the degree of leakage from the circular flow—the greater the leakage, the smaller the multiplier. The same conclusion is valid when the foreign sector is incorporated into the model—the greater the marginal propensity to import, the smaller the expenditure multiplier. The purchase of foreign goods involves an outflow of spending power from the domestic economy and our willingness to buy imported goods as the economy expands can be seen as a *trade dampener* on the multiplier. In fact, we can modify the expenditure multiplier formula to include the marginal propensity to import as follows:

$$m = 1/(MPS + MTR + MPM) = 1/\text{Marginal Propensity to Leak}$$

The complete circular flow diagram is presented in Figure 8.10.

If a nation runs a balance of trade surplus (its exports exceed its imports) then the earnings gained can be used to increase the nation's net wealth, either by acquiring more holdings of foreign assets (government or private) or by buying back domestic assets that have been held by foreigners. A surplus nation such as China might buy U.S. Treasury debt, real estate in California, ownership in American corporations, or pay off some of its own previously incurred liabilities. By contrast, a nation with a balance of trade deficit faces a reduction in its net wealth in order to pay for the extra expenditure, achieved by selling off assets owned overseas or at home.

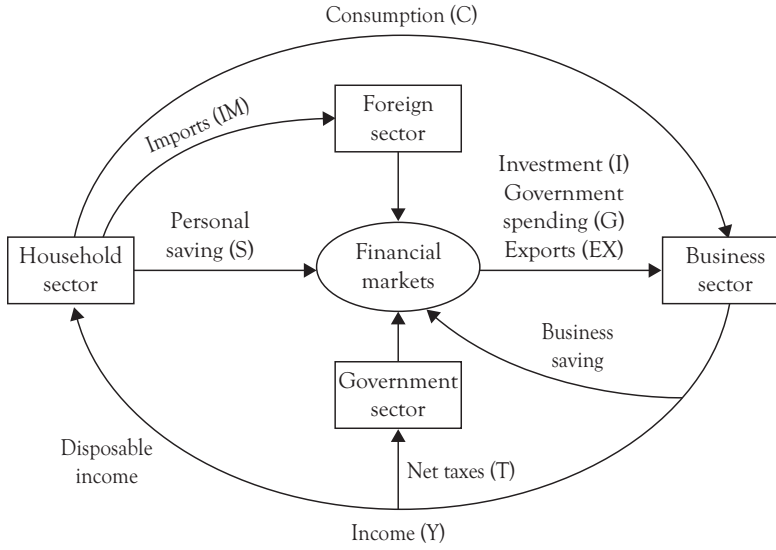

Figure 8.10 The complete circular flow diagram

Macroeconomic Policy in an Open Economy

Fiscal and monetary policy makers face additional challenges when operating in an open economy. As we have seen, the size of the expenditure multiplier is reduced because of the leakage of income overseas. Let us assume that the economy is in recession and that the government wishes to stimulate it with expansionary fiscal or monetary measures. How will policy actions influence the balance of trade and the exchange rate?

Fiscal Policy, the Balance of Trade, and the Exchange Rate: An expansionary fiscal policy calls for increases in government spending or cuts in taxes. Such a policy will increase aggregate demand, causing increases in both real GDP and the aggregate price level. As the economy grows more prosperous, imports will expand. Further, as the domestic price level rises, foreign goods will become increasingly attractive. Combined, these effects will cause a deterioration in the balance of trade and a depreciation in the exchange rate. However, with more transactions and an increasing price level, the demand for money will increase, pushing up the interest

rate—the *monetary dampener* effect that we met in Chapter 7. The higher interest rate will make domestic investments more attractive for foreigners and, therefore, there will be an upward pressure on the exchange rate.

Conclusion We should predict that an expansionary fiscal policy will cause a deterioration in the balance of trade, but will have an indeterminate effect on the exchange rate, at least in the short run. In the longer term, the rising domestic price level may cause a decline in the value of the currency.

Monetary Policy, the Balance of Trade, and the Exchange Rate: An expansionary monetary policy involves an increase in the money supply (probably through open-market operations) and downward pressure on interest rates, even with the offsetting presence of the monetary dampener. Again, such a policy will increase aggregate demand. The subsequent increase in real GDP will stimulate imports, as will the increase in the domestic aggregate price level. The balance of trade will deteriorate, as will the exchange rate. Because the net effect of the policy on interest rates is to make them decline, there is a greater incentive to invest overseas, causing a further downward pressure on the exchange rate.

Conclusion We should predict that an expansionary monetary policy will cause a deterioration in the balance of trade, and that the currency will depreciate.

Application: China—A Currency Manipulator?

During the presidential race of 2012, both candidates accused China of being a "currency manipulator, close up and in 2018, President Trump has straddled both sides of the issue." In fact, this charge was first leveled at the emerging Chinese economy as far back as 1992. Let us consider two questions: "How can China manipulate its currency?" and "Why would China wish to manipulate its currency?"

How Can China Manipulate Its Currency?

A nation may keep its currency's value low either by decreasing the demand for it or by increasing the supply of it. Alternatively, the manipulator could target a rival currency and drive up its value by increasing the demand for it. If China, for example, wishes to keep its currency (the yuan) low in value relative to the dollar, then it could pump yuan into international currency markets, exchanging them for the dollars necessary to purchase dollar-denominated U.S. government debt. The supply of yuan increases, as does the demand for dollars and the Chinese accumulate holdings of U.S. debt and dollars. China is the largest foreign holder of U.S. government debt currently, with over 20 percent of the total, (up from 6 percent in 2000).

Why Would China Wish to Manipulate Its Currency?

A nation may wish to manipulate its currency to "peg" it, that is, to keep it stable relative to that of an important trading partner, thus reducing uncertainty about the cost of international transactions. There is good evidence that, from 1994 to 2010, China engaged in this practice—the yuan/dollar exchange rate scarcely moved during that period.

The thrust of the accusations of currency manipulation is, however, not so much that the yuan's value was stable but that the yuan was *undervalued*. A cheap yuan (and expensive dollar) makes Chinese goods relatively cheap for American purchasers, increasing China's competitiveness, whereas prospective Chinese purchasers of American goods are discouraged. In addition to merchandise, a cheap currency is a boon to services—China is the world's third most-frequent destination for tourists, for example. Allowing a currency appreciation would diminish these competitive advantages.

Chinese reserves of foreign currency grew rapidly in the decade following 2005, from about $500 million to almost $4 trillion as the People's Bank of China sought to prevent undue appreciation in the yuan. From this high point, however, reserves began to drain away dramatically as the Chinese economy faltered and the authorities struggled to prevent a depreciation by selling foreign reserves. Eventually, faced with unsustainable losses of foreign reserves, the Chinese central

bank depreciated its currency. If a policy of undervaluation had been present before, this move signaled the end of that policy. Indeed, the huge surpluses accumulated by China proved to be a bit of a mixed blessing, because China struggled to find sufficient profitable investment opportunities. Further, with a booming economy, China experienced higher inflation than either the United States or the European Union (its main trading partner), which thus blunted some of its competitive edge.

Review: Although our macroeconomic model has been expanded to incorporate the international sector, the basic ADAS structure remains intact. We have established that international trade can be beneficial and have examined common arguments for protectionism. In addition, we have expanded the analysis of exchange rates that we began in Chapter 2, and considered how the presence of international transactions modifies the conduct of fiscal and monetary policy.

CHAPTER 9

Economic Growth and Lasting Lessons

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

- Outline the rationale of modern supply-side policies and evaluate the effectiveness of such policies.
- Define economic growth and identify the three sources of economic growth.
- Interpret the information presented by an aggregate production function.
- Describe the causes of diminishing marginal productivity.
- Describe the insights of endogenous growth theory.
- Outline the issues involved in achieving sustainable long-run growth.
- Discuss the "lasting lessons" of macroeconomics.

In 1728, Jonathan Swift, satirist and author of *Gulliver's Travels,* sowed an intellectual seed that bore fruit in a Washington, DC restaurant two and a half centuries later. Swift noted that imposing higher duties on imports caused government revenues not to increase, but to decrease because, with higher penalties, there was a stronger incentive to avoid payment through smuggling and other tactics. His insight into increasing taxes and decreasing revenues—as he put it, that two plus two equal not four but one—was repeated by David Hume and, most influentially, by Adam Smith in *The Wealth of Nations*.

In 1974, the American economy was wracked with inflation and President Ford had launched the WIN (Whip Inflation Now) campaign,

which included proposed tax increases designed to soak up income that might otherwise be spent, aggravating inflationary pressures. In a high-level meeting with senior White House officials, economist Arthur Laffer argued that raising tax rates would be counterproductive because excessively high tax rates would generate fewer revenues, not more. He sketched the so-called *Laffer Curve* on a table napkin—modern supply-side economics was born.

Chapter Preview: This chapter shifts the primary focus of our discussion from the short run to the long run and from demand-side concerns to supply-side ones. Many of the debates over economic policy can be seen as boiling down to differences of opinion regarding the relative effectiveness of demand-side and supply-side actions. We will begin by exploring supply-side policy prescriptions and then move on to look at the sources of long-run economic growth.

Supply-Side Economics: Defeating Unemployment and Inflation Simultaneously

The roots of modern supply-side economic thought run deep. Because of their confidence in the preeminence of the long run, the Classical economists and their successors have largely subscribed to the view that the government sector ought to be small, balanced, and noninterventionist. Short-run stabilization policy is not for them. As George W. Bush stated, "Stay the course," a view in sharp distinction to the Keynesian dictum that "In the long run we're all dead."

We examined Classical economics in Chapter 5—modern supply-side economics is one of its more recent manifestations. The underlying belief in the potency of markets, incentives, and self-interest to create wealth and prosperity is pure Adam Smith.

The Supply-Side Rationale

Supply-side policies are crafted to increase the incentives to supply labor, to save, and to invest more in capital and, thereby to nurture potential output, shifting the long-run aggregate supply curve and, therefore, the short-run aggregate supply curve, to the right, as shown in Figure 9.1.

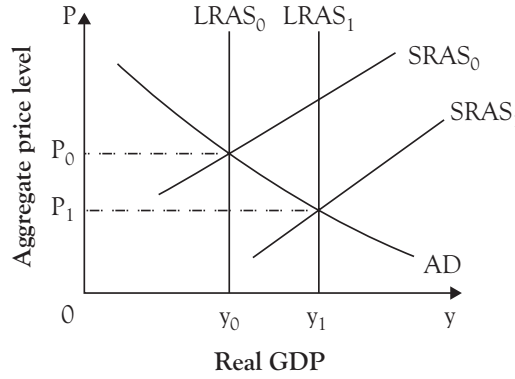

Figure 9.1 The rationale behind supply-side policies

By doing so, the aggregate price level will be driven down, from P_0 to P_1, reducing inflationary pressures, while additional job opportunities will be created. With more robust economic activity and an expanding tax base, tax revenues can grow and transfers shrink, allowing budget deficits to be tamed, despite (or because of) reductions in tax rates.

Incentives and Self-Interest

Adam Smith argued that self-interested individuals, driven by incentives and as if directed by "an invisible hand," will produce that mix of goods and services that most fully satisfies the needs of society—in other words, self-interest, operating through liberalized markets, is allocatively efficient. To be sure, there are roles for government, as a regulator of markets and as a provider of so-called public goods including national defense, but the private sector is the main engine of production. The more effectively that engine is allowed to run, the more productive the economy will be.

By reforming the tax code, so that productive individuals could keep more of what they earned, the supply-siders argued that more resources would be supplied—more resources are supplied as taxes are reduced and rewards are increased. With higher take-home pay, more workers would be willing to work more hours; with less tax on interest earnings, households would be encouraged to save more; with incentives to invest (investment tax credits) and a greater reward for successful entrepreneurship (lower taxes on profits), more business ventures would be encouraged to flourish.

Many of these points remain hotly debated. These issues resurfaced in 2017 with the passage of the Tax Cuts and Jobs Act. The effect of the Act was to redistribute the tax burden, mainly from the rich to the poor, with the expectation that any shortfalls in tax collections would be recouped through increased tax revenues due to subsequent higher levels of economic activity.

Trust in Private Market Efficiency

Although reforming the tax code is a centerpiece of supply-side economics, the rationale is not restricted to this one tactic. Any impediment to production, such as burdensome regulations on businesses, high interest rates due to government deficits (the crowding-out effect), or inflexibilities in resource or financial markets, are likely to be viewed unfavorably.

THINK IT THROUGH: As a presidential candidate, Ronald Reagan promised cutbacks in environmental regulations. During his presidency, when supply-side economics held center stage, the economy experienced deregulation in the agricultural, transportation, and financial sectors. The minimum wage remained virtually unchanged throughout the Reagan years and, therefore, in real terms, declined in value. Can you see how each of these policies is in agreement with the supply-side stance?

The Laffer Curve

If supply-side policies could achieve the twin goals of controlling inflation and alleviating unemployment but could do so at the cost of sharply higher government deficits, then their appeal would be diminished. However, the Laffer Curve, depicted in Figure 9.2, seemed to offer a rationale for expecting such policies to be deficit-reducing.

The Laffer Curve diagram shows tax receipts on the horizontal axis and the average tax rate on the vertical axis. Clearly, if the tax rate is zero, then no tax receipts will be collected. Similarly, if the tax rate is 100 percent, then, again, no tax receipts will be collected, because of the profound disincentive to work and massive noncompliance. There must be a tax rate (t*) between these two extremes at which tax revenues are maximized and

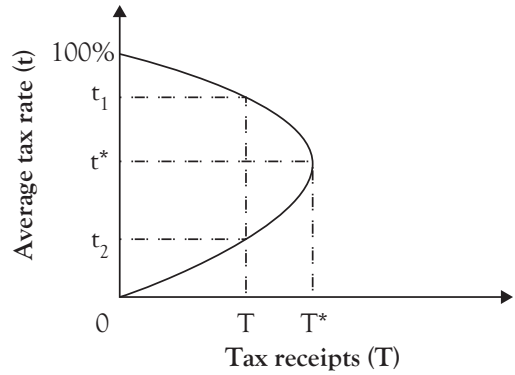

Figure 9.2 The Laffer curve

if tax rates are higher than this level, then tax rate cuts will increase tax revenues while boosting incentives to work by allowing taxpayers to retain more of their salaries. Laffer believed that prior tax policies had pushed the tax rate beyond t* to a point such as t_1. By reducing the tax rate from t_1 to t*, Laffer contended that tax revenues would increase.

Policy Recommendations

The supply-side rationale supports reductions in personal and corporate tax rates and in the capital gains tax rate in order to increase the supply of labor and capital. With lower income tax rates, individuals' after-tax income is increased, providing a greater incentive to work.

Similarly, by cutting taxes on earnings from savings, the flow of funds into financial markets would swell, reducing interest rates and, therefore, the cost of investment. Further, by offering more generous investment tax credits, capital accumulation should increase, resulting in greater productivity. In addition, government regulation of private sector enterprise should be lessened.

Evaluation of Supply-Side Economics

Although an alluring theory, little empirical evidence supports the supply-side view. Supply-side effects, to the extent that they exist at all, seem dwarfed by demand-side changes. Income tax cuts, taken in the name of supply-side policy during the Reagan years, raised disposable income and, from there, stimulated the economy through shifts in aggregate demand.

Similarly, an investment tax credit, while it may increase productive capacity, also has the more immediate and stronger impact of increasing spending on investment.

THINK IT THROUGH: Certainly, a particular policy may have influence both on the supply side and on the demand side of the economy. Early in his administration, President George W. Bush proposed a tax cut, arguing that lower taxes would motivate workers to greater effort and entrepreneurs to greater investment—a "supply-side" argument. Before the tax cut was in effect, however, the economy suffered a recession, and the president shifted ground, contending that the tax cut would strengthen aggregate demand by boosting consumption spending!

Tax cuts aimed at increasing the supply of labor, or encouraging saving, seem less effective than those aimed at spurring business investment. On balance, such policies have at best a minor impact on productive capacity in the long run; although, because it certainly has been demonstrated that taxpayer behavior is influenced by changes in marginal tax rates, any future tax rate proposals must be assessed carefully. A side effect of policies that pursue growth by reducing capital gains taxes or corporate income taxes is the likely widening of income inequalities within society, as the successful thrive and the unsuccessful survive.

Finally, history's judgment has come down heavily against the Laffer Curve's prediction that tax rate cuts would increase tax receipts and shrink the budget deficit. In fact, referring to Figure 9.2, the evidence shows that, far from having a tax rate similar to t_1, the economy's rate was similar to t_2, meaning that reduced tax rates exacerbated deficit problems.

Although the supply-side economics experiment of the 1980s is generally judged a failure—respected economist and former head of George W. Bush's Council of Economic Advisors, Gregory Mankiw refers to it as "fad economics," a less unkind term than "voodoo economics"—its call for lower taxes and smaller, less interventionist, government still appeals to many and the upsurge in belief in the power of incentives, less

regulation, and self-interest to shape our national destiny persists in the economic and political arenas. This may be the true legacy of supply-side economics—no longer can we focus exclusively on the demand-side effects of policy actions. As an example, it is significant that President Obama's American Recovery and Reinvestment Act (2009), although largely Keynesian and demand-side in approach, also allocated funding for infrastructure investment, technological improvements, and human capital enhancements—all measures that a supply-sider would advocate.

In further defense of supply-side economics, we should note the limitations on the effectiveness of orthodox Keynesian policy that were exposed during the Great Recession. Many economies, including the United States and the Europeans, adopted policy stances that were primarily Keynesian and, yet, more than 5 years after the onset of slowdown, those economies still exhibited sluggish economic performance with frail growth and persistently high unemployment. In Chapter 6, we identified some of the problems associated with Keynesian fiscal policy—declining and unpredictable fiscal multipliers, the crowding-out effect on the private sector of government borrowing, capital flight, the political disincentives incurred in fiscal discipline.

Sources of Economic Growth

In this section, we consider how economic growth occurs and how it may be sustained. Why do some countries grow more rapidly than others do? Is there an optimal environment that nurtures growth and, if so, can policy actions improve our chances of creating such an environment?

First, though, we must define terms—what is economic growth? We may define **economic growth** as the expansion in the quantity of goods and services produced by an economy as time goes by. For convenience, this is often measured in terms of real GDP (gross domestic product) and, frequently, because population changes over time, as per capita real GDP.

Achieving Growth

If asked how we could promote economic growth, we should reply, "Add resources, improve resources, and improve resource performance."

Although reckoned by many to be a failure, supply-side economics offers some clues about improving growth performance by emphasizing the encouragement of labor and investment in capital.

"Add Resources"

We can learn from history. Great empires have grown by expanding their territories and exploiting the resources of their colonies and hinterlands. In the nineteenth century, for example, Britain ascended to the summit of world power through its single-minded acquisition of territory. France, Germany, the Netherlands, and Belgium followed suit. Earlier, Napoleon, and later, Hitler, sought to acquire additional human and natural resources for similar purposes.

The United States prospered by the Louisiana Purchase, the development of resources through successive Homestead Acts, and the purchase of Alaska from Russia. Successive waves of immigrants augmented the existing supply of labor as did, in the most brutal way, the slave trade. Additional resources—human, capital, and natural—promote growth.

In fact, we reached this conclusion in our first chapter (Volume I), when we considered the production possibility frontier. As we saw there, the frontier—the boundary between what the economy can produce and what it cannot—expands as resources increase in quantity, improve in quality, or are combined more productively through advances in technology, as shown in Figure 9.3.

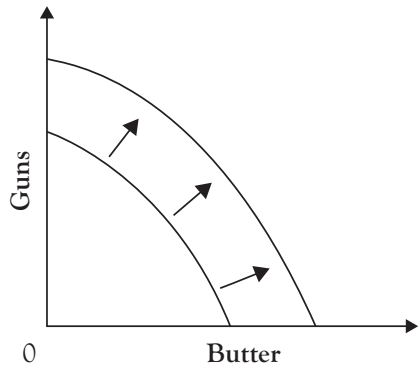

Figure 9.3 Economic growth

Using the production possibility frontier as a guide, we can visualize economic growth as an outward shift of the frontier—with growth we become able to produce more guns and more butter.

Adding more resources bestows a greater capacity to process—together, Robinson Crusoe and Man Friday can produce more than Crusoe alone. When the Dutch enclosed and drained the saltwater from the Zuiderzee, they successfully created a freshwater lake and 600 square miles of land—the new province of Flevoland.

A Digression on the Law of Diminishing Marginal Productivity: In 1798, an English clergyman, the Reverend Thomas "Bob" Malthus, published *An Essay on the Principle of Population*. Wildly controversial, it ran through six editions while he was alive and remains highly influential today. Malthus, and subsequent Classical economists, contended that constraints on the availability of farmland would limit the world's ability to feed its population, resulting in famine and disease. In the oil-strapped 1970s, The Club of Rome (a global think tank) published *The Limits to Growth*, making essentially the same point that, because of limitations in nonrenewable natural resources, sustained long-run economic growth is an unattainable dream.

If Malthus and his modern advocates are correct—that there is a limit to the quantity of key resources—then, as other resources, such as labor, are added to the productive effort, the productivity of these additional resources will decline until, eventually, no further gains in production can be eked out. Supporters of this view, that marginal productivity will decline, observe "you can't feed the world from a flowerpot."

We can see the effect of diminishing marginal productivity in the following diagram, which shows an aggregate production function.

A *production function* is a device (a graph or a mathematical formula) that relates the quantities of inputs to the quantity of output—either for an individual firm or for the overall economy—an *aggregate production function* relates inputs and output at the overall level. In Figure 9.4, we have one variable input, units of labor, shown on the horizontal axis. All other resources (for simplicity, we will assume only capital equipment) are fixed in quantity—we have a given amount of machines (K_{100} in our example). Real GDP is shown on the vertical axis.

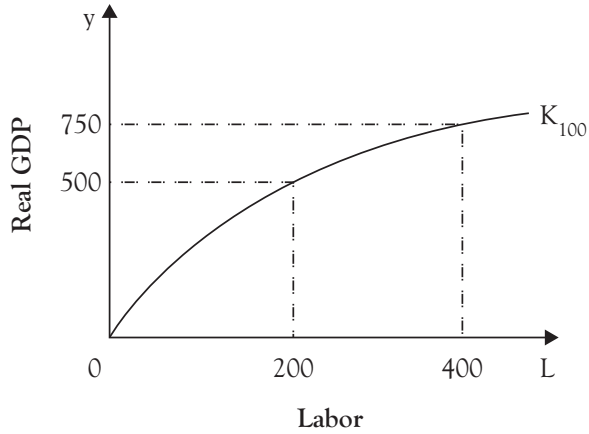

Figure 9.4 An aggregate production function with diminishing marginal productivity

Note: The slope of the production function *is* the marginal product of labor. Recall that the slope of a line is "rise over run." Here, the "rise" is the change in output whereas the "run" is change in labor input.

As we add workers to our stock of machines, output will increase but, as the slope of the production function shows, the rate of increase decreases—marginal productivity declines. If, for example, we double the number of workers from 200 to 400, then output level will change from 500 to 750 units—increasing but not doubling.

Are such predictions—that we simply will "run out" of resources—a realistic view? Probably not. As we will see, rapid accumulation of physical and human capital and technological innovation permit sustained expansions in labor productivity. There are creative ways around apparent constraints.

"Improve Resources"

If, instead of adding more resources—more workers, for example—we keep the same quantity of resources but improve their quality, then we still should experience economic growth and the production possibility frontier will still shift outward. If a worker trains and acquires new skills, this acquisition is termed "human capital." If better nutrition or public health programs are introduced, or if literacy programs are made more widespread, then our given stock of workers will become more

productive—healthy and educated workers can do more than sickly and illiterate ones. Education of any kind that increases the abilities of our labor force is an investment in human capital.

We can also increase the productivity of our workers by providing them with more capital or better capital—a secretary with a word processor is more productive than is a secretary with a typewriter. Cell phones and laptops, and the ability to use them, increase productivity. When compared with workers in other countries, American workers are highly productive, partly because of the greater quantity of our human capital—education and training, work ethic, level of health—and partly because of the greater quantity of capital available.

The impact of additional or improved resources on the economy's production function is shown in Figure 9.5.

In Figure 9.5, the 200 workers, using 100 units of capital, can produce 500 units of output. If additional capital is given to the same number of workers, we would expect increased production—graphically, the production function will swing upward (from K_{100} to K_{200}). However, the law of diminishing marginal productivity still applies—doubling the capital stock, from 100 to 200 machines, increases but does not double production. Adding a further 100 machines will have a still smaller positive impact on production, as shown by K_{300}. Additions to human capital or technological improvements will have a similar result—expansions in output, but at a decreasing rate of increase.

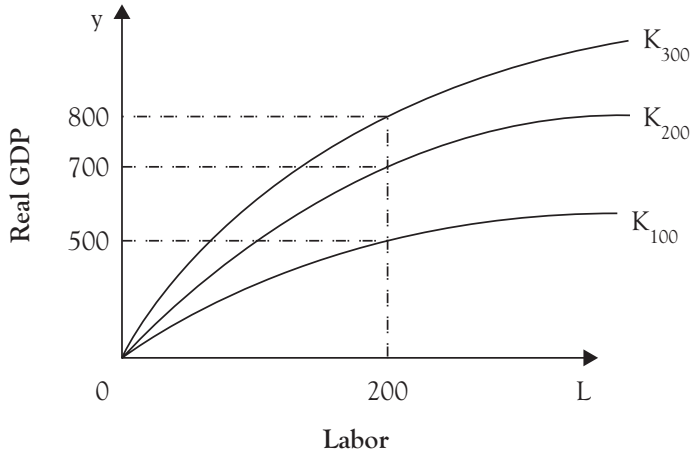

Figure 9.5 Shifting the production function

THINK IT THROUGH: The high school graduation rate in the United States is well over 80 percent, with more than 25 percent of the population going on to earn at least a bachelor's degree. Entering the labor force, these workers embody significant knowledge and skills, especially when set against the legions around the world who are barely literate or who have never had the opportunity to complete grade school.

THINK IT THROUGH (MORE)**:** Consider the massive stock of capital within the borders of the United States—including not just the privately owned factories, warehouses, and machines, but also the social capital, such as roads, airports, and docks. A corn farmer in Kansas has easy access to sophisticated tractors, computerized irrigations systems, and mechanization. Aerial spraying can control pests or crop disease and spare parts for machines are readily available, only a phone call away. This farmer's counterpart in Mexico has few of these options and, consequently, is less productive. In other, less developed, economies even dependable sources of fuel or water may be limited.

"Improve Resource Performance"

Economic growth can also be fostered by technological improvements and innovation—using the same resources as before, but more effectively. Put differently, it is implausible that an economy will be able to sustain growth merely by increasing its resources—it must also find new and more effective ways of combining the resources it has.

Innovation is the discovery and application of more efficient production techniques or the development of new products. A better crop rotation system may boost agricultural yields, for instance, a better floor plan in a factory or improved management techniques may enhance production. Fresh insight may result in ways of combining or eliminating steps in a process, achieving the same or better results with less use of resources. The genetic modification of crops, controversial or not, is an example of innovation where a "new" product has been engineered.

THINK IT THROUGH: Consider the automobile of today and the car your grandparents drove. Today's car is assembled by highly mechanized robotic assembly lines with computers guiding the flow of resources. Much of the heavy and costly steel that used to weigh down the cars of yesteryear has been replaced with plastics and other composite materials that are lighter, stronger, and more durable. Under the hood, tiny computers direct the engine systems, monitoring and optimizing performance, causing less fuel to be needed, while a catalytic converter reduces tail-pipe pollutants (unless you have switched to an electric vehicle!). Mechanical breakdowns are rare and GPS allows you to reach your destination without error, saving time and, again, conserving fuel.

Perhaps the largest area where technological change has been felt is in the field of information technology. Today's college student can be far more productive than a student from her parents' generation, perhaps from the 1980s. The student in the 1980s had no Wikipedia—in fact, no Internet access at all as we recognize it today. There was no Google, and e-mail was still in its infancy. Finding resources in the campus library would require a physical search through a card catalog. There were no online classes. Graphing calculators were uncommon and expensive and, although word processers were available, they were still fairly unusual, while smartphones or laptops in class were science fiction. The innovations of the digital age bestow on today's student learning advantages undreamed of by her parents.

So far, we have identified the broad sources of economic growth—more resources, improved resources, and better ways of combining resources. Given the limitations inherent in natural resources, in practical terms growth will typically spring from capital accumulation through investment in human and physical capital and from innovation and improvements and technology. We can model this process in Figure 9.6.

This model indicates that production derives from the innovative combination of our resources and technology. That production then may be consumed or saved. Think of a farm producing corn. The more corn that is consumed, the less will be saved and, therefore, the less there will be available for next year's planting. Saving begets investment and

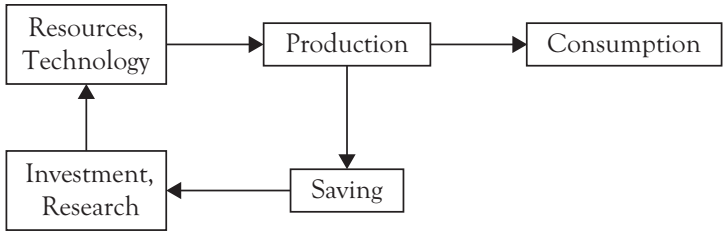

Figure 9.6 A simple model of economic growth

investment augments the resources and technology available for future production. According to this model, there is a trade-off between consumption today and consumption tomorrow—the more corn we consume today, the less corn we will be able to consume in the future.

It is certainly true that the saving rate is a key predictor of successful growth—countries with high saving rates tend to grow more rapidly than those countries with low saving rates. Investment equips workers to do the job and to sustain productivity growth and, if saving is lacking, then either investment is stalled or funds must be attracted from foreign sources.

New (Endogenous) Growth Theory

Until fairly recently, the orthodox view held that innovation was unpredictable and serendipitous—simply "happening" without economic rhyme or reason—and that, therefore, capital formation was the preferred engine for growth. However, even with capital accumulation, the threat of diminishing marginal productivity remains alive because, as we have seen in Figure 9.5, each successive addition to a growing stock of capital has a smaller impact on productivity, leading to renewed concerns about the viability of sustained growth.

Rather than changes in the quantity or quality of resources, *endogenous growth theory* emphasizes the role of innovation and technology in fostering economic growth and, importantly, that technological change is *not* a random event but the result of economic structures and incentives that create *knowledge capital*—the knowledge accumulated from experience, education, and research and development. Moreover, unlike a machine or a newly trained worker whose contribution to production is restricted to one office or factory, it is contended that knowledge capital

is not bound by the law of diminishing marginal productivity because new knowledge bestows benefits throughout the economy. Whether this assertion—that knowledge bestows positive externalities that overcome diminishing marginal productivity—is valid remains unproven but endogenous growth theory has opened up for discussion the topic of how to promote innovation and, more broadly, what can be done to achieve higher growth rates.

Promoting Sustainable Growth

The Convergence Hypothesis

One of the implications of diminishing marginal productivity is that economies that have achieved high standards of living will tend to grow more slowly than those with lower standards of living because the introduction of additional resources should have a stronger impact on output in the "poor" country than those same resources will have in the "rich" country. In addition, "poor" countries, starting late, should be able to learn from, and avoid, the mistakes of "rich" countries by adopting only those production techniques and technologies that have been shown to be effective.

Although it is true that some nations have successfully transitioned from low to high per capita GDP performance—Japan and the other "Asian tigers" are obvious examples—numerous other countries have failed to catch up. Convergence is not guaranteed.

The question remains, "Why do some economies prosper while others languish?" Increasingly, the focus has been on the role of institutions in fostering or retarding growth. Underachieving countries frequently have weak financial and governmental institutions, corruption, and inadequate protection for lenders and investors, all of which discourage capital investment. With respect to human capital, an economy with a strong educational system and healthy workers will prosper relative to one with low educational standards and poor health provision. In addition, laggards often suffer from *capital flight* and a *brain drain*, as funds that could have been invested locally seek safer or higher returns elsewhere and as skilled workers emigrate to more lucrative or rewarding environments.

What are the conditions necessary for an economy to achieve and sustain a satisfactory rate of economic growth? We may identify two broad conditions—enhancements to saving and investment and to innovation.

Opportunities and Incentives to Save and Invest

Saving provides the funding for investment, so policies that encourage saving enhance investment. Replacing income tax with a national sales tax, although potentially regressive, would offer incentives to save rather than to spend. Thinking of the crowding-out effect of government spending, reductions in government deficits would allow more, and cheaper, funds to flow to private investment projects. While considering supply-side policies earlier in this chapter, we found that modifications of the tax code to reward investment—reduced capital gains taxes, investment tax credits, and corporate taxes—has had fairly minor influence but, cumulatively, over the long term, provision of additional permanent incentives ought to establish bolder patterns of capital accumulation.

Let us not forget that education and training represent investments in *human* capital so growth is assisted by improvements in the quality of education and its availability. Pell grants, low-interest student loans, and federal funding for colleges all reduce the cost and increase the accessibility of education and, hence, all promote human capital investment and economic growth. Expanding online offerings has a similar effect—reducing the "cost" of attending college.

Opportunities and Incentives to Innovate

Innovation begins with invention of new technologies. Over time, waves of invention—such as the development of steam power and, most recently, computer chips and the Internet—have driven economies forward. Although a new technology may spring from a happy accident, it is more likely to come from a culture that supports basic research and development. The United States offers substantial support to R&D through funding of research programs at public universities and organizations such as NASA, Department of Defense, and the National Science Foundation. Rather than merely "more" education in general, there has

been an increased particular emphasis on STEM education—science, technology, engineering, and math. Superior engineers, for instance, should develop superior technologies. Additional government support for private research comes from the tax code (for example, the Research and Experimentation Tax Credit, introduced in the early "supply-side" days), and robustly enforced patent laws, intellectual property rights, and trademarks. In itself, political stability and adherence to the rule of law cultivates the soil in which fresh ideas germinate.

Lasting Lessons

President Truman once quipped that he needed a "one-handed economist," because every time he asked for a policy recommendation the advisor's reply would be in the form "on one hand, this, but, on the other hand, that," resulting in no definite answer! There's a grain of truth in this story because economists can differ quite widely in their interpretation of a given situation.

Economics is an endlessly intriguing field of study, and one in which two plus two seldom add up to equal only four. Our views of policy effectiveness are colored by the relative emphasis we place on short-run outcomes and long-run outcomes, the role of government, and so on. Policy choices are buffeted by emerging new (and old) schools of thought. Currently, Keynesian demand-side views are in the ascendancy but, a few years ago, supply-siders had the ear of policy makers. Other opinions, such as the Austrian school, are lurking on the wings, waiting for their opportunity at stardom. Is it any wonder, then, that students of macroeconomics, looking for "the" answer, all too often come away from their course of study with a feeling of bafflement?

It is true, however, that macroeconomists have been patiently building a consensus and, although it is a hard-fought struggle, we can distill some durable lessons.

First, Adam Smith mostly had it right. Remarkably, many of Smith's views have come down to us largely intact and untarnished. To be sure, his emphasis was "supply side" and "long run" but, nevertheless, his faith in the benevolence of the "invisible hand" and in the productive power of lightly regulated markets resonates today.

What lessons can we take away from our brief exploration of macroeconomics? Here are 10 "big ideas."

Big Idea #1: *"Choice involves cost or, there's no such thing as a free lunch."* Choices matter and trade-offs exist because of scarcity. When we choose an option, we give up all the other competing options—there is an opportunity cost and that is the value placed on the next most preferred alternative given up. In a world of limited resources, our actions have consequences, and no lunches are free.

Big Idea #2: *"Trade is beneficial in that it increases value for the traders."* More precisely, free trade voluntarily entered into can be mutually beneficial. Smith's *The Wealth of Nations* was a reaction against the restrictive mercantilist trade policies of the time and his argument was that exchange benefits both partners. A generation later, David Ricardo provided the theoretical confirmation with his Law of Comparative Advantage. Is trade *always* beneficial? No, certainly not for every individual. In the past, textile workers in North Carolina and car workers in Michigan have suffered from trade liberalization. In times of high unemployment, for instance, the temptation to "save jobs" through protectionist policies may be compelling but, in general, freer trade generates gains that restricted trade denies.

Big Idea #3: *"Individuals and firms respond to incentives and markets efficiently coordinate production, distribution, and consumption."* Self-interest and incentives drive the participants in competitive markets to produce the mix of goods that is most preferred by society. Governments function is to act as a referee, facilitating transactions and standing by to levy sanctions when the market's rules are broken.

THINK IT THROUGH: By this point, it should not be surprising to you to learn that the overwhelming majority of economists support the legalization of marijuana. This is not because economists believe that marijuana smoking is a desirable activity (although they may!) but because, generally, prohibitions or restrictions on markets are felt to be undesirable, inefficient, and costly.

Big Idea #4: *"Sometimes markets fail."* As discussed in Chapter 6, there are cases where third parties are affected, positively or negatively,

by market transactions. Markets are blind to such external effects and, therefore, government intervention is required. There is also scope for government intervention in situations where one party is capable of wielding undue power, or where free riders (that is, those who can receive the benefits of a good or service without having to pay) exist.

Big Idea #5: *"Fiscal and monetary actions primarily affect the demand-side of the economy and can influence output, employment, and the price level, but only in the short-run."* Demand-side (Keynesian-style) stabilization policies that are a short-term fix for unemployment will have no lasting beneficial impact on economic performance but, if financed by printing money, can stoke inflation and, through the crowding-out effect, can impair the effectiveness of the private sector.

Big Idea #6: *"Demand-side fiscal and monetary actions involve a short-run trade-off between inflation and unemployment."* Expansionary policies may boost output and alleviate unemployment in the short run, but one consequence is higher rates of inflation. Put differently, one consequence of choosing to combat inflation with contractionary demand-side policies is that more households will suffer the stresses of unemployment.

Big Idea #7: *"In the long run, it's the rate of expansion in the money supply that determines the rate of inflation."* In general, the proponents of the Quantity Theory are correct. Over the long haul, the rate at which we print money sets the rate at which the aggregate price level rises—our inflation rate is largely a product of actions taken jointly by the government and the Fed.

Big Idea #8: *"In the long run, there's no significant trade-off between the inflation rate and either the unemployment rate or the level of production."* Except when hyperinflation results, printing more money, or less, has no major impact on our long-term standard of living because the long-run aggregate supply curve is vertical.

Big Idea #9: *"Economic growth is a supply-side phenomenon."* Demand-side policies have little influence on our long-term economic performance. Further, capital expansion and innovation are the keys to sustained growth. The choices we make about consumption and saving today set the stage for our ability to consume in the future.

Big Idea #10: *"The economy has a long-run self-correcting mechanism, although it may be weak."* As we saw in Chapter 6, markets will operate to

push the economy toward full employment—in the long run. This does not mean, however, that there is no role for short-run stabilization policy when the economy is not at full employment. We may still feel that intervention to hasten the restoration of full employment is justified.

Parting Thoughts

Welcome to the final section of our book. If you've read all nine chapters, then you've been challenged and worked hard, and you've encountered many economic concepts that I hope you will carry with you through life. Economics is the study of the choices we make as we pass through life—the world is our laboratory and our concepts are useless if we fail to apply them to that life. Certainly, you should have a sharper awareness of the transactions that surround you, the news that meets you each morning, and your perspectives on personal and global events.

At the very beginning of our first chapter (Volume I), you were asked to imagine being in a restaurant and consulting the menu of choices. Economics is all about choice. We must make choices as we strive to achieve the best outcomes possible in our own self-interest. Individually, and as a society, we must make choices because, although we have unlimited wants, we have limited resources to meet those wants. Along the way, imperfections in the market mechanism or special considerations may make those choices difficult to realize, but the more aware we are of the imperfections and of the nature of the process itself, the more likely it is that our choices will serve us well.

My best wishes to you in the choices you make this day and in your future days.

About the Author

Thomas M. Beveridge has been teaching students the principles of macroeconomics for over 30 years. Currently, he is an instructor of economics at Durham Technical Community College in North Carolina. He received an award for teaching excellence while at North Carolina State University and holds master's degrees in economics and in education from the University of Dundee in the United Kingdom and has undertaken PhD studies at the University of North Carolina at Chapel Hill. He has had published student learning and teaching materials, has acted as a reviewer for several major "principles of economics" textbooks, and has authored an innovative audio presentation of principles of economics for VangoNotes.

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