In Chapters 23 and 24, we discussed the market for goods and services—the goods market—without mentioning money, the money market, or the interest rate. We described how the equilibrium level of aggregate output (income) ($Y$) is determined in the goods market. At given levels of planned investment spending ($I$), government spending ($G$), and net taxes ($T$), we were able to determine the equilibrium level of output in the economy. In Chapters 25 and 26, we discussed the financial market, or money market, barely referring to the goods market, as we explained how the equilibrium level of the interest rate is determined in the money market.

The goods market and the money market do not operate independently, and the purpose of this chapter is to put the two markets together. The key link between the two markets is the interest rate. When the Fed changes the money supply and thus changes the interest rate, this affects aggregate demand. In practice the main components of aggregate demand that are affected by the interest rate are consumption of durable goods, housing investment, and plant and equipment investment by firms. When the interest rate increases, these components of aggregate demand decrease. For simplicity we will assume in what follows that only investment by firms—what we are calling planned investment—is affected by the interest rate. This is discussed in the next section. Keep in mind, however, that this is done only for simplicity. In practice, the interest rate affects other components of aggregate demand. In particular, households are affected through their demand for durable goods (autos, furniture, and the like) and their demand for housing.

Once we postulate that planned investment depends on the interest rate, we will see that events in the money market affect the goods market and events in the goods market affect the money market. Only by analyzing the two markets together can we determine the values of aggregate output (income) ($Y$) and the interest rate ($r$) that are consistent with the existence of equilibrium in both markets.

Looking at both markets simultaneously also reveals how fiscal policy affects the money market and how monetary policy affects the goods market. This is what we will do in this chapter. By establishing how the two markets affect each other, we will show how open market purchases of government securities (which expand the money supply) affect the equilibrium level of aggregate output. Similarly, we will show how fiscal policy measures affect the interest rate.

The relationship between aggregate output and the price level that exists when the goods and money markets are combined can be summarized in a curve called the aggregate demand (AD) curve. Every point on the AD curve reflects equilibrium in both the goods and money markets for the given price level. In the last part of this chapter, we derive the AD curve from the relationships in the goods and money markets. The AD curve is then used in the next chapter in determining the price level. For purposes of this chapter the price level $P$ is still not determined. Also, remember that $Y$ is real income, not nominal income.
Planned Investment and the Interest Rate

We have so far assumed for simplicity that planned investment is fixed, and we now must relax this assumption. In practice planned investment depends on many factors, but we focus here on just one: the interest rate. Recall that investment refers to a firm’s purchase of new capital—new machines and plants. Whether a firm decides to invest in a project depends on whether the expected profits from the project justify its costs. And one cost of an investment project is the interest cost. When a manufacturing firm builds a new plant, the contractor must be paid at the time the plant is built. The money needed to carry out such projects is generally borrowed and paid back over an extended period. The real cost of an investment project thus depends in part on the interest rate—the cost of borrowing. When the interest rate rises, it becomes more expensive to borrow and fewer projects are likely to be undertaken; increasing the interest rate, *ceteris paribus*, is likely to reduce the level of planned investment spending. When the interest rate falls, it becomes less costly to borrow and more investment projects are likely to be undertaken; reducing the interest rate, *ceteris paribus*, is likely to increase the level of planned investment spending.

The relationship between the interest rate and planned investment is illustrated by the downward-sloping demand curve in Figure 27.1. The higher the interest rate, the lower the level of planned investment. At an interest rate of 3 percent, planned investment is \( I_0 \). When the interest rate rises from 3 to 6 percent, planned investment falls from \( I_0 \) to \( I_1 \). As the interest rate falls, however, more projects become profitable, so more investment is undertaken. The curve in Figure 27.1 is sometimes called the “marginal efficiency of investment” curve.

Other Determinants of Planned Investment

The assumption that planned investment depends only on the interest rate is obviously a simplification, just as is the assumption that consumption depends only on income. In practice, the decision of a firm on how much to invest depends on, among other things, its expectation of future sales. If a firm expects that its sales will increase in the future, it may begin to build up its capital stock—that is, to invest—now so that it will be able to produce more in the future to meet the increased level of sales. The optimism or pessimism of entrepreneurs about the future course of the economy can have an important effect on current planned investment. Keynes used the phrase *animal spirits* to describe the feelings of entrepreneurs, and he argued that these feelings affect investment decisions.

We come back to this issue in Chapter 31, where we take a closer look at firm behavior (and household behavior), but for now we will assume that planned investment simply depends on the interest rate.

---

**FIGURE 27.1**

**Planned Investment Schedule**

Planned investment spending is a negative function of the interest rate. An increase in the interest rate from 3 percent to 6 percent reduces planned investment from \( I_0 \) to \( I_1 \).
CHAPTER 27 Aggregate Demand in the Goods and Money Markets

Planned Aggregate Expenditure and the Interest Rate

We can use the fact that planned investment depends on the interest rate to consider how planned aggregate expenditure (AE) depends on the interest rate. Recall that planned aggregate expenditure is the sum of consumption, planned investment, and government purchases. That is,

\[ AE = C + I + G \]

We now know that there are many possible levels of I, each corresponding to a different interest rate. When the interest rate changes, planned investment changes. Therefore, a change in the interest rate (r) will lead to a change in total planned spending (C + I + G) as well.\(^1\)

Figure 27.2 shows what happens to planned aggregate expenditure and output when the interest rate rises from 3 percent to 6 percent. At the higher interest rate, planned investment is lower; planned aggregate expenditure thus shifts downward. Recall from Chapters 23 and 24 that a fall in any component of aggregate spending has an even larger (or “multiplier”) effect on equilibrium income (Y). When the interest rate rises, planned investment (and planned aggregate expenditure) falls and equilibrium output (income) falls by even more than the fall in planned investment. In Figure 27.2, equilibrium Y falls from \( Y_0 \) to \( Y_1 \) when the interest rate rises from 3 percent to 6 percent.

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\(^1\) When we look in detail in Chapter 31 at the behavior of households in the macroeconomy, we will see that consumption spending (C) is also stimulated by lower interest rates and discouraged by higher interest rates.
We can summarize the effects of a change in the interest rate on the equilibrium level of output. The effects of a change in the interest rate include:

- A high interest rate \( (r) \) discourages planned investment \( (I) \).
- Planned investment is a part of planned aggregate expenditure \( (AE) \).
- Thus, when the interest rate rises, planned aggregate expenditure \( (AE) \) at every level of income falls.
- Finally, a decrease in planned aggregate expenditure lowers equilibrium output (income) \( (Y) \) by a multiple of the initial decrease in planned investment.

Using a convenient shorthand:

\[
\begin{align*}
\text{r} & \uparrow \rightarrow I \downarrow \rightarrow AE \downarrow \rightarrow Y \downarrow \\
\text{r} & \downarrow \rightarrow I \uparrow \rightarrow AE \uparrow \rightarrow Y \uparrow
\end{align*}
\]

**Equilibrium in Both the Goods and Money Markets: The IS-LM Model**

It is now straightforward to see how the goods and money markets are linked. We have just seen that an increase in the interest rate \( (r) \) decreases output \( (Y) \) in the goods market because an increase in \( r \) lowers planned investment. A decrease in interest rates, conversely, raises output. This is the first link.

The second link can be seen in Figure 26.8 on p. 534. When income \( (Y) \) increases, this shifts the money demand curve to the right, which increases the interest rate \( (r) \) with a fixed money supply. We can thus write:

\[
\begin{align*}
Y \uparrow & \rightarrow M^d \uparrow \rightarrow r \uparrow \\
Y \downarrow & \rightarrow M^d \downarrow \rightarrow r \downarrow
\end{align*}
\]

In other words, an increase in \( Y \) increases \( r \) in the money market and a decrease in \( Y \) decreases \( r \).

Figure 27.3 summarizes the links between the two markets. Given this figure, we are essentially done with the analysis. We have derived what is sometimes referred to as the “IS-LM” model. Given the interest rate, the equilibrium level of output can be determined from the goods market. Given output, the equilibrium interest rate can be determined from the money market. Putting both markets together allows the one pair of equilibrium values of \( Y \) and \( r \) to be determined. The equilibrium value of \( Y \) is the value that is consistent with the equilibrium value of \( r \). There is equilibrium in both markets for the particular pair of values. In the Appendix to this chapter the IS-LM model is formally set up and the overall equilibrium is derived.
Policy Effects in the Goods and Money Markets

A useful way to examine the links between the goods and money markets is to consider the effects of changes in fiscal and monetary policy actions on the economy. We want to examine what happens to the equilibrium levels of output (Y) and interest rate (r) when policy changes. The three policy variables are government spending (G), net taxes (T), and the money supply (M³).

Expansionary Policy Effects

Any government policy aimed at stimulating aggregate output (income) (Y) is said to be expansionary. An expansionary fiscal policy is an increase in government spending (G) or a reduction in net taxes (T) aimed at increasing aggregate output (income) (Y). An expansionary monetary policy is an increase in the money supply aimed at increasing aggregate output (income) (Y).

Expansionary Fiscal Policy: An Increase in Government Purchases (G) or a Decrease in Net Taxes (T)

As you know from Chapter 24, government purchases (G) and net taxes (T) are the two tools of government fiscal policy. The government can stimulate the economy—that is, it can increase aggregate output (income) (Y)—either by increasing government purchases or by reducing net taxes. Although the impact of a tax cut is somewhat smaller than the impact of an increase in G, both have a multiplier effect on the equilibrium level of Y.

Consider an increase in government purchases (G) of $10 billion. This increase in expenditure causes firms’ inventories to be smaller than planned. Unplanned inventory reductions stimulate production, and firms increase output (Y). However, because added output means added income, some of which is subsequently spent, consumption spending (C) also increases. Again, inventories will be smaller than planned and output will rise even further. The final equilibrium level of output is higher by a multiple of the initial increase in government purchases.

This multiplier story is incomplete, however. Until this chapter, we have assumed that planned investment (I) is fixed at a certain level, but we now know that planned investment depends on the interest rate. We can now discuss what happens to the multiplier when investment varies because we have an understanding of the money market, in which the interest rate is determined.

Return to our multiplier story at the point that firms first begin to raise output in response to an increase in government purchases. As aggregate output (income) (Y) increases, an impact is felt in the money market—the increase in income (Y) increases the demand for money (M³). (We are assuming that the Fed holds the quantity of money supplied [M³] constant.) The resulting disequilibrium, with the quantity of money demanded greater than the quantity of money supplied, causes the interest rate to rise. The increase in G increases both Y and r.

The increase in r has a side effect—a higher interest rate causes planned investment spending (I) to decline. Because planned investment spending is a component of planned aggregate expenditure (C + I + G), the decrease in I works against the increase in G. An increase in government spending (G) increases planned aggregate expenditure and increases aggregate output, but a decrease in planned investment reduces planned aggregate expenditure and decreases aggregate output.

This tendency for increases in government spending to cause reductions in private investment spending is called the crowding-out effect. Without any expansion in the money supply to accommodate the rise in income and increased money demand, planned investment spending is partially crowded out by the higher interest rate. The extra spending created by the rise in government purchases is somewhat offset by the fall in planned investment spending. Income expansionary fiscal policy. An increase in government spending or a reduction in net taxes aimed at increasing aggregate output (income) (Y).

expansionary monetary policy. An increase in the money supply aimed at increasing aggregate output (income) (Y).

crowding-out effect. The tendency for increases in government spending to cause reductions in private investment spending.
still rises, but the multiplier effect of the rise in $G$ is lessened because of the higher interest rate’s negative effect on planned investment.

This crowding-out effect is illustrated graphically in Figure 27.4. An increase in government purchases from $G_0$ to $G_1$ shifts the planned aggregate expenditure curve $(C + I_0 + G_0)$ upward. The increase in $(Y)$ from $Y_0$ to $Y_1$ causes the demand for money to rise, which results in a disequilibrium in the money market. The excess demand for money raises the interest rate, causing $I$ to decrease from $I_0$ to $I_1$. The fall in $I$ pulls the planned aggregate expenditure curve back down, which lowers the equilibrium level of income to $Y^*$. (Remember that equilibrium is achieved when $Y = AE$.) The possibility of some crowding out of firm investment by increased government spending is a subject of political debate as well as economic analysis. To the extent that there is some crowding out, an increase in government spending as a way to increase aggregate output leads to a reduced share of private-sector (that is, firm) investment in GDP. There is considerable disagreement among voters and politicians in the United States about what constitutes the right mix of private investment and public spending in a healthy economy.

Note that the size of the crowding-out effect and the ultimate size of the government spending multiplier depend on several things. First, we assumed that the Fed did not change the quantity of money supplied. If we were to assume instead that the Fed expanded the quantity of money to accommodate the increase in $G$, the multiplier would be larger. In this case, the higher demand for money would be satisfied with a higher quantity of money supplied and the interest rate would not rise. Without a higher interest rate, there would be no crowding out.

Second, the crowding-out effect depends on the sensitivity or insensitivity of planned investment spending to changes in the interest rate. Crowding out occurs because a higher interest rate reduces planned investment spending. Investment depends on factors other than the interest rate, however, and investment may at times be quite insensitive to changes in the interest rate. If planned investment does not fall when the interest rate rises, there is no crowding-out effect. These effects are summarized next.

**Effects of an expansionary fiscal policy:**

$$G \uparrow \rightarrow Y \uparrow \rightarrow M^d \uparrow \rightarrow r \uparrow \rightarrow I \downarrow$$

$\Rightarrow$ $Y$ increases less than if $r$ did not increase

Exactly the same reasoning holds for changes in net taxes. The ultimate effect of a tax cut on the equilibrium level of output depends on how the money market reacts. The expansion of $Y$ that a tax cut brings about will lead to an increase in the interest rate and thus a decrease in

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**FIGURE 27.4**

*The Crowding-Out Effect*

An increase in government spending $G$ from $G_0$ to $G_1$ shifts the planned aggregate expenditure schedule from 1 to 2. The crowding-out effect of the decrease in planned investment (brought about by the increased interest rate) then shifts the planned aggregate expenditure schedule from 2 to 3.
planned investment spending. The ultimate increase in \( Y \) will therefore be less than it would be if the interest rate did not rise.

**Expansionary Monetary Policy: An Increase in the Money Supply**  Now let us consider what will happen when the Fed decides to increase the supply of money through open market operations. At first, open market operations inject new reserves into the system and expand the quantity of money supplied (the money supply curve shifts to the right). Because the quantity of money supplied is now greater than the amount households want to hold, the equilibrium rate of interest falls. Planned investment spending (which is a component of planned aggregate expenditure) increases when the interest rate falls.

Increased planned investment spending means planned aggregate expenditure is now greater than aggregate output. Firms experience unplanned decreases in inventories, and they raise output (\( Y \)). An increase in the money supply decreases the interest rate and increases \( Y \). However, the higher level of \( Y \) increases the demand for money (the demand for money curve shifts to the right), which keeps the interest rate from falling as far as it otherwise would.

If you review the sequence of events that follows the monetary expansion, you can see the links between the injection of reserves by the Fed into the economy and the increase in output. First, the increase in the quantity of money supplied pushes down the interest rate. Second, the lower interest rate causes planned investment spending to rise. Third, the increased planned investment spending means higher planned aggregate expenditure, which means increased output as firms react to unplanned decreases in inventories. Fourth, the increase in output (income) leads to an increase in the demand for money (the demand for money curve shifts to the right), which means the interest rate decreases less than it would have if the demand for money had not increased.

The power of monetary policy to affect the goods market depends on how much of a reaction occurs at each link in this chain. Perhaps the most critical link is the link between \( r \) and \( I \). Monetary policy can be effective only if \( I \) reacts to changes in \( r \). If firms sharply increase the number of investment projects undertaken when the interest rate falls, expansionary monetary policy works well at stimulating the economy. If, however, firms are reluctant to invest even at a low interest rate, expansionary monetary policy will have limited success. In other words, the effectiveness of monetary policy depends on the slope of the investment function. If it is nearly vertical, indicating very little responsiveness of investment to the interest rate, the middle link in this chain will be weak, rendering monetary policy ineffective.

**Contractionary Policy Effects**

Any government policy that is aimed at reducing aggregate output (income) (\( Y \)) is said to be contractionary. Where expansionary policy is used to boost the economy, contractionary policy is used to slow the economy.

**Contractionary Fiscal Policy: A Decrease in Government Spending (\( \mathcal{G} \)) or an Increase in Net Taxes (\( \mathcal{T} \))**  A contractionary fiscal policy is a decrease in government spending (\( \mathcal{G} \)) or an increase in net taxes (\( \mathcal{T} \)) aimed at decreasing aggregate output (income) (\( Y \)). The effects of this policy are the opposite of the effects of an expansionary fiscal policy.

A decrease in government purchases or an increase in net taxes leads to a decrease in aggregate output (income) (\( Y \)), a decrease in the demand for money (\( M^d \)), and a decrease in

---

2 As we discuss in Chapter 31, consumption (\( C \)) may also depend on \( r \), which further increases the effectiveness of monetary policy.
the interest rate \((r)\). The decrease in \(Y\) that accompanies a contractionary fiscal policy is less than it would be if we did not take the money market into account because the decrease in \(r\) also causes planned investment \((I)\) to increase. This increase in \(I\) offsets some of the decrease in planned aggregate expenditure brought about by the decrease in \(G\). (This also means the multiplier effect is smaller than it would be if we did not take the money market into account.) The effects of a decrease in \(G\), or an increase in \(T\), can be represented as shown.

\[
\text{Effects of a contractionary fiscal policy:} \quad G \downarrow \text{ or } T \uparrow \rightarrow Y \downarrow \rightarrow M^d \downarrow \rightarrow r \downarrow \rightarrow I \uparrow \rightarrow Y \downarrow
\]

\(\Rightarrow Y\) decreases less than if \(r\) did not decrease

## Contractionary Monetary Policy: A Decrease in the Money Supply

A **contractionary monetary policy** is a decrease in the money supply aimed at decreasing aggregate output (income) \((Y)\). As you recall, the level of planned investment spending is a negative function of the interest rate: The higher the interest rate, the less planned investment there will be. The less planned investment there is, the lower planned aggregate expenditure will be and the lower the equilibrium level of output (income) \((Y)\) will be. The lower equilibrium income results in a decrease in the demand for money, which means that the increase in the interest rate will be less than it would be if we did not take the goods market into account.

\[
\text{Effects of a contractionary monetary policy:} \quad M^d \downarrow \rightarrow r \uparrow \rightarrow I \downarrow \rightarrow Y \downarrow \rightarrow M^d \downarrow \rightarrow r \uparrow
\]

\(\Rightarrow r\) increases less than if \(M^d\) did not decrease

## The Macroeconomic Policy Mix

Although we have been treating fiscal and monetary policy separately, it should be clear that fiscal and monetary policy can be used simultaneously. For example, both government purchases \((G)\) and the money supply \((M^d)\) can be increased at the same time. We have seen that an increase in \(G\) by itself raises both \(Y\) and \(r\), while an increase in \(M^d\) by itself raises \(Y\) but lowers \(r\). Therefore, if the government wanted to increase \(Y\) without changing \(r\), it could do so by increasing both \(G\) and \(M^d\) by the appropriate amounts.

**Policy mix** refers to the combination of monetary and fiscal policies in use at a given time. A policy mix that consists of a decrease in government spending and an increase in the money supply favors private investment spending over government spending. The reason is that both the increased money supply and the fall in government purchases cause the interest rate to fall, which leads to an increase in planned investment. The opposite is true for a mix that consists of an expansionary fiscal policy and a contractionary monetary policy. This mix favors government spending over investment spending. Such a policy has the effect of increasing government spending and reducing the money supply. Tight money and expanded government spending drives the interest rate up and planned investment down.

There is no rule about what constitutes the “best” policy mix or the “best” composition of output. On this issue, as on many other issues, economists (and others) disagree. In part, someone’s preference for a certain composition of output—say, one weighted heavily toward private spending with relatively little government spending—depends on how that person stands on such issues as the proper role of government in the economy.

Table 27.1 summarizes the effects of various combinations of policies on several important macroeconomic variables. If you can explain the reasoning underlying each of the effects shown in the table, you can be satisfied that you have a good understanding of the links between the goods market and the money market.
The Aggregate Demand (AD) Curve

As we noted at the beginning of this chapter, the aggregate price level $P$ is not determined in this chapter. This must wait until the next chapter. In fact, $P$ has not even been mentioned in the previous analysis. Where does $P$ fit in? We need to go back to the demand for money curve in Figure 26.8 on p. 534. In this graph if $P-Y$ increases, the money demand curve shifts to the right, which increases the interest rate. In the previous analysis we used this graph by noting that if $Y$ increases, the money demand curve shifts to the right, which increases the interest rate—and conversely if $Y$ decreases. Thus, in Figure 27.3 on p. 545 we note that money demand depends on $Y$. Remember that in the money demand model in Chapter 26, the demand for money depends on nominal income (and the interest rate). If real income ($Y$) increases and the price level ($P$) is fixed, then obviously nominal income ($P-Y$) increases. So an increase in $Y$, with $P$ fixed, shifts the money demand curve to the right, which increases the interest rate. This is all we have used so far.

The next step is to ask what happens if $P$ changes, and this is clear. If $P$ increases, the money demand curve shifts to the right, which increases the interest rate. This is just like a $Y$ increase. Nominal income can increase because real income increases or because the price level increases, and an increase in nominal income shifts the money demand curve to the right and increases the interest rate. The increase in the interest rate that results from an increase in $P$ leads to a fall in planned investment; so in the new equilibrium, $Y$ is lower. Conversely, if $P$ decreases, the money demand curve shifts to the left, which decreases the interest rate, which increases planned investment, which results in a higher equilibrium value of $Y$. There is thus a negative relationship between the price level $P$ and real aggregate output (income) $Y$. This relationship is called the aggregate demand (AD) curve, shown in Figure 27.6. This analysis is spelled out in Figure 27.5.

It is important to be clear on what we have done. We have taken the policy variables $G$, $T$, and $M'$ to be fixed. Given particular values of the policy variables and a particular value of $P$, we can determine the equilibrium values of $Y$ and $r$ (as well as $C$ and $I$). These values correspond to equilibrium in the goods market and the money market for the given value of $P$ and the values of the policy variables. Now we change $P$ but leave the policy variables unchanged, and we determine new equilibrium values of $r$ and $Y$. Thus for each value of $P$ we can get an equilibrium value of $Y$, and the AD curve is just a plot of these values. Each point on the AD curve corresponds to equilibrium in the goods market and the money market for the given value of $P$. Remember, we are not determining $P$. We are just plotting equilibrium values of $Y$ for given values of $P$.

The Aggregate Demand Curve: A Warning

It is important that you realize what the aggregate demand curve represents. The aggregate demand curve is more complex than a simple individual or market demand curve. The $AD$ curve is not a demand curve, and it is not the sum of all market demand curves in the economy.
To understand why, recall the logic behind a simple downward-sloping household demand curve. A demand curve shows the quantity of output demanded (by an individual household or in a single market) at every possible price, 

\[ \text{ceteris paribus} \]

In drawing a simple demand curve, we are assuming that other prices and income are fixed. From these assumptions, it follows that one reason the quantity demanded of a particular good falls when its price rises is that other prices do not rise. The good in question therefore becomes more expensive relative to other goods, and households respond by substituting other goods for the good whose price increased. In addition, if income does not rise when the price of a good does, real income falls. This may also lead to a lower quantity demanded of the good whose price has risen.

Things are different when the overall price level rises. When the overall price level rises many prices—including many wage rates (many people’s income)—rise together. For this reason, we cannot use the \textit{ceteris paribus} assumption to draw the \textit{AD} curve. The logic that explains why a simple demand curve slopes downward fails to explain why the \textit{AD} curve also has a negative slope. Aggregate demand falls when the price level increases because the higher price level causes the demand for money \((M^d)\) to rise. With the money supply constant, the interest rate will rise to

\[ \text{FIGURE 27.6} \]

**The Aggregate Demand (\textit{AD}) Curve**

At all points along the \textit{AD} curve, both the goods market and the money market are in equilibrium. The policy variables \(G, T,\) and \(M^s\) are fixed.
reestablish equilibrium in the money market. It is the higher interest rate that causes aggregate output to fall. The AD curve traces the relationship between the overall price level and aggregate demand, taking into account the behavior of firms and households in the goods and money markets at the same time.

You do not need to understand anything about the money market to understand a simple individual or market demand curve. However, to understand what the aggregate demand curve represents, you must understand the interaction between the goods market and the money markets, namely the analysis summarized in Figure 27.5.

**Other Reasons for a Downward-Sloping Aggregate Demand Curve**

In addition to the effects of money supply and money demand on the interest rate, two other factors lie behind the downward slope of the AD curve. These are the consumption link and the real wealth effect.

**The Consumption Link** We noted in Chapter 22 (and will discuss in detail in Chapter 31) that consumption \( (C) \) also depends on the interest rate. Other things being equal, consumption expenditures tend to rise when the interest rate falls and to fall when the interest rate rises—just as planned investment does. This tendency is another link between the goods market and the money market. If something happens to change the interest rate in the money market, both consumption and planned investment are affected in the goods market.

The consumption link provides another reason for the AD curve’s downward slope. An increase in the price level increases the demand for money, which leads to an increase in the interest rate, which leads to a decrease in consumption (as well as planned investment), which leads to a decrease in aggregate output (income). The initial decrease in consumption (brought about by the increase in the interest rate) contributes to the overall decrease in output. Planned investment does not bear all the burden of providing the link from a higher interest rate to a lower level of aggregate output. Decreased consumption brought about by a higher interest rate also contributes to this effect.

**The Real Wealth Effect** We also noted in Chapter 23 (and will discuss in detail in Chapter 31 that consumption depends on wealth. Other things being equal, the more wealth households have, the more they consume. Wealth includes holdings of money, shares of stock, bonds, and housing, among other things. If household wealth decreases, the result will be less consumption now and in the future.

The price level has an effect on some kinds of wealth. Suppose you are holding $1,000 in a checking account or in a money market fund and the price level rises by 10 percent. Your holding is now worth 10 percent less because the prices of the goods that you could buy with your $1,000 have all increased by 10 percent. The purchasing power (or "real value") of your holding has decreased by 10 percent.

An increase in the price level may also lower the real value of stocks and housing, although whether it does depends on what happens to stock prices and housing prices when the overall price level rises. If stock prices and housing prices rise by the same percentage as the overall price level, the real value of stocks and housing will remain unchanged. If an increase in the price level does lower the real value of wealth, this is another reason for the downward slope of the AD curve. If real wealth falls, this leads to a decrease in consumption, which leads to a decrease in aggregate output (income). So if real wealth falls when there is an increase in the price level, there is a negative relationship between the price level and output through this real wealth effect or real balance effect.

**Shifts of the Aggregate Demand Curve from Policy Variables**

We have already seen in this chapter how the three policy variables \( G, T, \) and \( MS \) affect the equilibrium value of \( Y \). It will be useful for purposes of the next chapter to show how these variables affect the AD curve. We have seen that when \( MS \) increases, the interest rate falls and \( Y \) increases. Thus for a fixed \( P \) an increase in \( MS \) leads to a larger value of \( Y \), which is a shift of the AD curve to the right. This is shown in Figure 27.7. We have also seen that when \( G \) increases or \( T \) decreases, \( Y \) increases. Thus for a fixed \( P \) an increase in \( G \) or a decrease in \( T \) leads to a larger value of \( Y \), which is a shift of the AD curve to the right. This is shown in Figure 27.8.
The same reasoning applies to a decrease in \( MS \), a decrease in \( G \), and an increase in \( T \). All these shift the \( AD \) curve to the left. Figure 27.9 summarizes the ways the \( AD \) curve shifts in response to changes in \( MS \), \( G \), and \( T \).

There is a danger when analyzing shifts of the \( AD \) curve to forget what is behind them. For example, a shift to the right due to an increase in \( MS \) has a lower interest rate associated with it, whereas a shift to the right due to an increase in \( G \) or a decrease in \( T \) has a higher interest rate associated with it. To see the complete picture you need to go back to the earlier analysis in this chapter. The \( AD \) curve is derived from the complete analysis, but it does not explicitly show all the details.

\[ \text{FIGURE 27.7} \]

**The Effect of an Increase in Money Supply on the \( AD \) Curve**

An increase in the money supply (\( M^s \)) causes the aggregate demand curve to shift to the right, from \( AD_0 \) to \( AD_1 \). This shift occurs because the increase in \( M^s \) lowers the interest rate, which increases planned investment (and thus planned aggregate expenditure). The final result is an increase in output at each possible price level.

The same reasoning applies to a decrease in \( M^s \), a decrease in \( G \), and an increase in \( T \). All these shift the \( AD \) curve to the left. Figure 27.9 summarizes the ways the \( AD \) curve shifts in response to changes in \( M^s \), \( G \), and \( T \).

There is a danger when analyzing shifts of the \( AD \) curve to forget what is behind them. For example, a shift to the right due to an increase in \( M^s \) has a lower interest rate associated with it, whereas a shift to the right due to an increase in \( G \) or a decrease in \( T \) has a higher interest rate associated with it. To see the complete picture you need to go back to the earlier analysis in this chapter. The \( AD \) curve is derived from the complete analysis, but it does not explicitly show all the details.

\[ \text{FIGURE 27.8} \]

**The Effect of an Increase in Government Purchases or a Decrease in Net Taxes on the \( AD \) Curve**

An increase in government purchases (\( G \)) or a decrease in net taxes (\( T \)) causes the aggregate demand curve to shift to the right, from \( AD_0 \) to \( AD_1 \). The increase in \( G \) increases planned aggregate expenditure, which leads to an increase in output at each possible price level. A decrease in \( T \) causes consumption to rise. The higher consumption then increases planned aggregate expenditure, which leads to an increase in output at each possible price level.
Looking Ahead: Determining the Price Level

Our discussion of aggregate output (income) and the interest rate in the goods and money markets is now complete. You should have a good understanding of how the two markets work together. The AD curve is a useful summary of this analysis in that every point on the curve corresponds to equilibrium in both the goods and money markets for the given value of the price level. We have not yet, however, determined the price level. This is the task of the next chapter.

1. The goods market and the money market do not operate independently. Events in the money market have effects on the goods market, and events in the goods market have effects on the money market.

PLANNED INVESTMENT AND THE INTEREST RATE p. 542

2. There is a negative relationship between planned investment and the interest rate because the interest rate affects the cost of investment projects. When the interest rate rises, planned investment decreases, and when the interest rate falls, planned investment increases.

3. For every value of the interest rate, there is a different level of planned investment spending and a different equilibrium level of output.

EQUILIBRIUM IN BOTH THE GOODS AND MONEY MARKETS: THE IS-LM MODEL p. 544

4. In the goods market, there is a negative relationship between the interest rate and output because there is a negative relationship between the interest rate and planned investment. In the money market, there is a positive relationship between the interest rate and output for a fixed money supply because if output increases, the interest rate must increase to achieve equilibrium in the money market.

5. Combining the goods and money markets determines the equilibrium values of both the interest rate and output.

POLICY EFFECTS IN THE GOODS AND MONEY MARKETS p. 545

6. An expansionary fiscal policy is an increase in government spending (G) or a reduction in net taxes (T) aimed at increasing aggregate output (income) (Y). An expansionary fiscal policy based on increases in government spending tends to lead to a crowding-out effect: Because increased government expenditures mean more transactions in the economy and thus an increased demand for money, the interest rate will rise. The decrease in planned investment spending that accompanies the higher interest rate will then partially offset the increase in aggregate expenditures brought about by the increase in G.

7. The size of the crowding-out effect, affecting the size of the government spending multiplier, depends on two things: the assumption that the Fed does not change the quantity of money supplied and the sensitivity or insensitivity of planned investment to changes in the interest rate.

8. An expansionary monetary policy is an increase in the money supply aimed at increasing aggregate output (income) (Y). An increase in the money supply leads to a lower interest rate, increased planned investment, increased planned aggregate expenditure, and ultimately a higher equilibrium level of aggregate output (income) (Y). Expansionary policies have been used to lift the economy out of recessions.

9. A contractionary fiscal policy is a decrease in government spending or an increase in net taxes aimed at decreasing aggregate output (income) (Y). A decrease in government spending or an increase in net taxes leads to a decrease in aggregate output (income) (Y), a decrease in the demand for money, and a decrease in the interest rate. However, the decrease in Y is somewhat offset by the additional planned investment resulting from the lower interest rate.

10. A contractionary monetary policy is a decrease in the money supply aimed at decreasing aggregate output (income) (Y). The higher interest rate brought about by the reduced money supply causes a decrease in planned investment spending and a lower level of equilibrium output. However, the lower equilibrium level of output brings about a decrease in the demand for money, which means the increase in the interest rate will be less than it would be if we did not take the goods market into account. Contractionary policies have been used to fight inflation.

11. The policy mix is the combination of monetary and fiscal policies in use at a given time. There is no rule about what constitutes the best policy mix or the best composition of output. In part, one’s preference for a certain composition of output depends on one’s stance concerning such issues as the proper role of government in the economy.
12. The aggregate demand (AD) curve graphs the negative relationship between aggregate output (income) and the price level. Each point on the AD curve is a point at which both the goods market and the money market are in equilibrium for a given value of the price level. The AD curve is not the sum of all the market demand curves in the economy.

13. An increase in the quantity of money supplied, an increase in government purchases, or a decrease in net taxes at a given price level shifts the aggregate demand curve to the right. A decrease in the quantity of money supplied, a decrease in government purchases, or an increase in net taxes shifts the aggregate demand curve to the left.

**REVIEW TERMS AND CONCEPTS**

- aggregate demand (AD) curve, p. 549
- expansionary monetary policy, p. 545
- contractionary fiscal policy, p. 547
- goods market, p. 541
- contractionary monetary policy, p. 548
- interest sensitivity or insensitivity of planned investment, p. 546
- crowding-out effect, p. 545
- money market, p. 542
- policy mix, p. 548
- real wealth, or real balance, effect, p. 551

**PROBLEMS**

All problems are available on www.myeconlab.com

1. On June 5, 2003, the European Central Bank acted to decrease the short-term interest rate in Europe by half a percentage point, to 2 percent. The bank’s president at the time, Willem Duisenberg, suggested that, in the future, the bank could reduce rates further. The rate cut was made because European countries were growing very slowly or were in recession. What effect did the bank hope the action would have on the economy? Be specific. What was the hoped-for result on C, I, and Y?

2. [Related to the Economics in Practice on p. 543] In response to concerns of both the Treasury Department and the Congressional Oversight Panel regarding the value of loans being made to small businesses, the four largest U.S. banks (Bank of America, Citigroup, JP Morgan Chase, and Wells Fargo) all agreed to increase their small business lending practices in 2010. Search the Internet and describe any changes that have occurred in lending to small businesses since 2010. The text states that it is unclear whether the reduced lending is due more to a lack of lenders or a lack of borrowers. Go to www.sba.gov/advo/research and click on “Small Business Indicators.” Select the most recent quarter from the quarterly indicator menu and describe what happened to demand for commercial and industrial loans as well as the level of optimism for small businesses. What correlation do you see between the changes in lending, the demand for loans, and the level of optimism for small businesses?

3. During the third quarter of 1997, Japanese GDP was falling at an annual rate of over 11 percent. Many blamed the big increase in Japan’s taxes in the spring of 1997, which was designed to balance the budget. Explain how an increase in taxes with the economy growing slowly could precipitate a recession. Do not skip steps in your answer. If you were head of the Japanese central bank, how would you respond? What impact would your policy have on the level of investment?

4. Some economists argue that the “animal spirits” of investors are so important in determining the level of investment in the economy that interest rates do not matter at all. Suppose that this were true—that investment in no way depends on interest rates.

5. For each of the following scenarios, tell a story and predict the effects on the equilibrium levels of aggregate output (Y) and the interest rate (r):

   a. During 2005, the Federal Reserve was tightening monetary policy in an attempt to slow the economy. Congress passed a substantial cut in the individual income tax at the same time.
   b. During the summer of 2003, Congress passed and President George W. Bush signed the third tax cut in 3 years. Many of the tax cuts took effect in 2005. Assume that the Fed holds M fixed.
   c. In 1993, the government raised taxes. At the same time, the Fed was pursuing an expansionary monetary policy.
   d. In 2005, conditions in Iraq led to a sharp drop in consumer confidence and a drop in consumption. Assume that the Fed holds the money supply constant.
   e. The Fed attempts to increase the money supply to stimulate the economy, but plants are operating at 65 percent of their capacities and businesses are pessimistic about the future.

6. Occasionally, the Federal Open Market Committee (FOMC) sets a policy designed to “track” the interest rate. This means that the FOMC is pursuing policies designed to keep the interest rate constant. If, in fact, the Fed were acting to counter any increases or decreases in the interest rate to keep it constant, what specific actions would you expect to see the Fed take if the following were to occur? (In answering, indicate the effects of each set of events on Y, C, S, I, M', M, and r.)

   a. An unexpected increase in investor confidence leads to a sharp increase in orders for new plants and equipment.
   b. A major New York bank fails, causing a number of worried people (not trusting even the FDIC) to withdraw a substantial amount of cash from other banks and put it in their cookie jars.
7. Paranoia, the largest country in central Antarctica, receives word of an imminent penguin attack. The news causes expectations about the future to be shaken. As a consequence, there is a sharp decline in investment spending plans.
   a. Explain in detail the effects of such an event on the economy of Paranoia assuming no response on the part of the central bank or the Treasury. (M, T, and G all remain constant.) Make sure you discuss the adjustments in the goods market and the money market.
   b. To counter the fall in investment, the king of Paranoia calls for a proposal to increase government spending. To finance the program, the chancellor of the exchequer has proposed three alternative options:
      (1) Finance the expenditures with an equal increase in taxes
      (2) Keep tax revenues constant and borrow the money from the public by issuing new government bonds
      (3) Keep taxes constant and finance the expenditures by printing new money
'Consider the three financing options and rank them from most expansionary to least expansive. Explain your ranking."

8. Why might investment not respond positively to low interest rates during a recession? Why might investment not respond negatively to high interest rates during a boom?

9. The aggregate demand curve slopes downward because when the price level is lower, people can afford to buy more and aggregate demand rises. When prices rise, people can afford to buy less and aggregate demand falls. Is this a good explanation of the shape of the AD curve? Why or why not?

10. By late summer 2010, the target fed funds rate was between zero and 0.25 percent. At the same time, “animal spirits” were dormant and there was excess capacity in most industries. That is, businesses were in no mood to build new plant and equipment if they were not using their already existing capital. Interest rates were at or near zero, and yet investment demand remained quite low. The unemployment rate was 9.6 percent in August 2010. These conditions suggest that monetary policy is likely to be a more effective tool to promote expansion than fiscal policy. Do you agree or disagree? Explain your answer.

11. Describe the policy mix that would result in each of the following situations.
   a. The interest rate decreases, investment increases, and the change in aggregate output is indeterminate
   b. Aggregate output increases, and the interest rate change is indeterminate.
   c. The interest rate increases, investment decreases, and the change in aggregate output is indeterminate.
   d. Aggregate output decreases, and the interest rate change is indeterminate.

12. In the first few chapters of this book, we introduced the notion of supply and demand. One of the first things we did was to derive the relationship between the price of a product and the quantity demanded per time period by an individual household. Now we have derived what is called the aggregate demand curve. The two look the same and both seem to have a negative slope, but the logic is completely different. Tell one story that explains the negative slope of a simple demand curve and another story that explains the more complex aggregate demand curve (AD).

13. Expansionary policies are designed to stimulate the economy by increasing aggregate output. Explain why expansionary fiscal policy and expansionary monetary policy have opposite effects on the interest rate despite having the same goal of increasing aggregate output. Illustrate your answer with graphs of the money market.

14. Explain the effect, if any, that each of the following occurrences should have on the aggregate demand curve.
   a. The Fed lowers the discount rate.
   b. The price level decreases.
   c. The federal government increases federal income tax rates in an effort to reduce the federal deficit.
   d. Pessimistic firms decrease investment spending.
   e. The inflation rate falls by 3 percent.
   f. The federal government increases purchases to stimulate the economy.

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**CHAPTER 27 APPENDIX**

The **IS-LM Model**

There is a useful way of depicting graphically the determination of aggregate output (income) and the interest rate in the goods and money markets. Two curves are involved in this diagram, the IS curve and the LM curve. In this Appendix, we will derive these two curves and use them to see how changes in government purchases (G) and the money supply (M) affect the equilibrium values of aggregate output (income) and the interest rate. The effects we describe here are the same as the effects we described in the main text; here we illustrate the effects graphically.

**The IS Curve**

We know that in the goods market there is an equilibrium level of aggregate output (income) (Y) for each value of the interest rate (r). For a given value of r, we can determine the equilibrium value of Y. The equilibrium value of Y falls when r rises and rises when r falls. There is thus a negative relationship between the equilibrium value of Y and r. The reason for this negative relationship is the negative relationship between planned investment and the interest rate. When the interest rate rises, planned investment (I) falls, and this decrease in I leads to a decrease in the equilibrium value of Y. The negative relationship between the equilibrium value of Y and r is shown in Figure 27A.1. This curve is called the **IS curve**.¹ Each point on the IS curve represents the equilibrium point in the goods market for the given interest rate.

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¹ The letter I stands for investment, and the letter S stands for saving. IS refers to the fact that in equilibrium in the goods market, planned investment equals saving.
PART V  The Core of Macroeconomic Theory

Aggregate output (income), \( Y \)

Interest rate, \( r \)

IS

G

0

LM

M

0

FIGURE 27A.1 The IS Curve
Each point on the IS curve corresponds to the equilibrium point in the goods market for the given interest rate. When government spending (\( G \)) increases, the IS curve shifts to the right, from IS\(_0\) to IS\(_1\).

We also know from our earlier analysis of the goods market that when government purchases (\( G \)) increase with a constant interest rate, the equilibrium value of \( Y \) increases. This means the IS curve shifts to the right when \( G \) increases. With the same value of \( r \) and a higher value of \( G \), the equilibrium value of \( Y \) is larger; when \( G \) decreases, the IS curve shifts to the left.

The LM Curve
In the money market, there is an equilibrium value of the interest rate (\( r \)) for every value of aggregate output (income) (\( Y \)). The equilibrium value of \( r \) is determined at the point at which the quantity of money demanded equals the quantity of money supplied. For a given value of \( Y \), we can determine the equilibrium value of \( r \) in the money market. We also know from Figure 27.5 that the equilibrium value of \( r \) rises when \( Y \) rises and falls when \( Y \) falls—a positive relationship between the equilibrium value of \( r \) and \( Y \). The reason for this positive relationship is the positive relationship between the demand for money and \( Y \). When \( Y \) increases, the demand for money increases because more money is demanded for the increased volume of transactions in the economy. An increase in the demand for money increases the equilibrium value of \( r \)—thus the positive relationship between the equilibrium value of \( r \) and \( Y \).

The positive relationship between the equilibrium value of \( r \) and \( Y \) is shown in Figure 27A.2. This curve is called the LM curve.\(^2\) Each point on the LM curve represents equilibrium in the money market for the given value of aggregate output (income).

We also know from our analysis of the money market that when the money supply (\( M^p \)) increases with a constant level of \( Y \), the equilibrium value of \( r \) decreases. As Figure 27A.2 shows, this means that the LM curve shifts to the right when \( M^p \) increases. With the same value of \( Y \) and a higher value of \( M^p \), the equilibrium value of \( r \) is lower. When \( M^p \) decreases, the LM curve shifts to the left.

The IS-LM Diagram
Figure 27A.3 shows the IS and LM curves together on one graph. The point at which the two curves intersect is the point at which equilibrium exists in both the goods market and the money market. There is equilibrium in the goods market because the point is on the IS curve, and there is equilibrium in the money market because the point is on the LM curve.

We now have only two tasks left. The first is to see how the equilibrium values of \( Y \) and \( r \) are affected by changes in \( G \)—fiscal policy. This is easy. We have just seen that an increase in \( G \) shifts the IS curve to the right. Thus, an increase in \( G \) leads to higher equilibrium values of \( Y \) and \( r \). This situation is illustrated in Figure 27A.4. Conversely, a

\(^2\) The letter \( L \) stands for liquidity, a characteristic of money. The letter \( M \) stands for money.
aggregate output (income) and the interest rate through shifts in the two curves. Always keep in mind the economic theory that lies behind the two curves. Do not memorize what curve shifts when; be able to understand and explain why the curves shift. This means going back to the behavior of households and firms in the goods and money markets.

It is easy to use the IS-LM diagram to see how there can be a monetary and fiscal policy mix that leads to, say, an increase in aggregate output (income) but no increase in the interest rate. If both $G$ and $M^s$ increase, both curves shift to the right and the shifts can be controlled in such a way as to bring about no change in the equilibrium value of the interest rate.

Our second task is to see how the equilibrium values of $Y$ and $r$ are affected by changes in $M^s$—monetary policy. This is also easy. We have just seen that an increase in $M^s$ shifts the $LM$ curve to the right. Thus, an increase in $M^s$ leads to a higher equilibrium value of $Y$ and a lower equilibrium value of $r$. This is illustrated in Figure 27A.5. Conversely, a decrease in $M^s$ leads to a lower equilibrium value of $Y$ and a higher equilibrium value of $r$ because a decreased money supply causes the $LM$ curve to shift to the left.

The IS-LM diagram is a useful way of seeing the effects of changes in monetary and fiscal policies on equilibrium aggregate output (income) and the interest rate through shifts in the two curves. Always keep in mind the economic theory that lies behind the two curves. Do not memorize what curve shifts when; be able to understand and explain why the curves shift. This means going back to the behavior of households and firms in the goods and money markets.

It is easy to use the IS-LM diagram to see how there can be a monetary and fiscal policy mix that leads to, say, an increase in aggregate output (income) but no increase in the interest rate. If both $G$ and $M^s$ increase, both curves shift to the right and the shifts can be controlled in such a way as to bring about no change in the equilibrium value of the interest rate.

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**APPENDIX SUMMARY**

An *IS curve* illustrates the negative relationship between the equilibrium value of aggregate output (income) ($Y$) and the interest rate in the goods market. An *LM curve* illustrates the positive relationship between the equilibrium value of the interest rate and aggregate output (income) ($Y$) in the money market. The point at which the *IS* and *LM* curves intersect is the point at which equilibrium exists in both the goods market and the money market.

**APPENDIX REVIEW TERMS AND CONCEPTS**

- **IS curve** A curve illustrating the negative relationship between the equilibrium value of aggregate output (income) ($Y$) and the interest rate in the goods market. p. 555
- **LM curve** A curve illustrating the positive relationship between the equilibrium value of the interest rate and aggregate output (income) ($Y$) in the money market. p. 556

**APPENDIX PROBLEMS**

1. Illustrate each of the following situations with IS-LM curves:
   a. An increase in $G$ with the money supply held constant by the Fed
   b. An increase in $G$ with the Fed changing $M^s$ by enough to keep interest rates constant
   c. A decrease in $G$ and an increase in $T$ while the Fed expands $M^s$
   d. An increase in $G$ and $T$ while the Fed holds $M^s$ constant during a period of inflation
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In 2009, the U.S. Consumer Price Index showed negative inflation. In 2010 inflation had risen to about a 2 percent annual rate, still well below historical levels. Nevertheless, at least one member of the Federal Reserve’s Board of Governors, Thomas Hoenig of Kansas City, remained concerned about the prospects of future inflation. In a speech about the need to reduce the stimulus bill, Hoenig argued, “I think we risk a very serious inflationary problem with new bubbles that could be created.” What causes an increase in a country’s overall price level, and why might Hoenig and other observers be worried? What tools do the Fed and the administration have to try to control inflation? These are the subjects of this chapter.

The determination of the overall price level in an economy is one of the central issues in macroeconomics. Inflation—an increase in the overall price level—is one of the key concerns of macroeconomists and government policy makers. In Chapter 22, we discussed how inflation is measured and the costs of inflation, but made no mention of the causes of inflation. For simplicity, our analysis in Chapters 23 through 27 took the price level as fixed. This allowed us to discuss the links between the goods market and the money market without the complication of a changing price level. Having considered how the two markets work, we are ready to take up flexible prices.

We derived the aggregate demand curve in Chapter 27. The first step in this chapter is to introduce the aggregate supply curve. Given the aggregate demand and aggregate supply curves, the equilibrium price level is just the intersection of the two curves. Once the equilibrium price level is determined, we can examine how fiscal and monetary policies affect the price level.

The Aggregate Supply Curve

Aggregate supply is the total supply of goods and services in an economy. Although there is little disagreement among economists about how the aggregate demand curve is derived, there is a great deal of disagreement about how the aggregate supply curve is derived. Differences among economists regarding the shape of the aggregate supply curve is one important factor giving rise to differences in policies they suggest to deal with macroeconomic problems such as inflation and unemployment.

The Aggregate Supply Curve: A Warning

The aggregate supply (AS) curve shows the relationship between the aggregate quantity of output supplied by all the firms in an economy and the overall price level. To understand the aggregate supply curve, we need to understand something about the behavior of the individual firms that make up the economy.
aggregate supply  The total supply of all goods and services in an economy.

aggregate supply (AS) curve  A graph that shows the relationship between the aggregate quantity of output supplied by all firms in an economy and the overall price level.

It may seem logical to derive the aggregate supply curve by adding together the supply curves of all the individual firms in the economy. However, the logic behind the relationship between the overall price level in the economy and the level of aggregate output (income)—that is, the AS curve—is very different from the logic behind an individual firm’s supply curve. The aggregate supply curve is not a market supply curve, and it is not the simple sum of all the individual supply curves in the economy. (Recall a similar warning for the aggregate demand curve in the last chapter.) The reason is that many firms (some would argue most firms) do not simply respond to prices determined in the market. Instead, they actually set prices. Only in perfectly competitive markets do firms simply react to prices determined by market forces. Firms in other kinds of industries (imperfectly competitive industries) make both output and price decisions based on their perceptions of demand and costs. Price-setting firms do not have individual supply curves because these firms are choosing both output and price at the same time. To derive an individual supply curve, we need to imagine calling out a price to a firm and having the firm tell us how much output it will supply at that price. We cannot do this if firms are also setting prices. If supply curves do not exist for imperfectly competitive firms, we certainly cannot add them together to get an aggregate supply curve!

What can we say about the relationship between aggregate output and the overall price level? Because many firms in the economy set prices as well as output, it is clear that an “aggregate supply curve” in the traditional sense of the word supply does not exist. What does exist is what we might call a “price/output response” curve—a curve that traces out the price decisions and output decisions of all firms in the economy under a given set of circumstances.

What might such a curve look like?

**Aggregate Supply in the Short Run**

Many argue that the aggregate supply curve (or the price/output response curve) has a positive slope, at least in the short run. (We will discuss the short-run/long-run distinction in more detail later in this chapter.) In addition, many argue that at very low levels of aggregate output—for example, when the economy is in a recession—the aggregate supply curve is fairly flat and that at high levels of output—for example, when the economy is experiencing a boom—it is vertical or nearly vertical. Such a curve is shown in Figure 28.1.

**Why an Upward Slope?**  Why might a higher price level be associated with more output, giving the AS curve a positive slope? Remember when we talk about the aggregate price level, we are talking about not only output prices but also prices of inputs, including the price of labor, or wages. If the only thing happening is that all prices, including wages, are increasing at the same rate, then it is plausible to think that there would be no output response. As prices rise, firms get more for their products and pay proportionately more for workers. The AS curve would be vertical. On the
other hand, if wages and prices do not move at the same time, if wages are “sticky,” then the AS curve may have a positive slope.

Consider the case in which there is an increase in aggregate demand and assume that firms in the economy are imperfectly competitive. The increase in aggregate demand shifts the demand curves facing individual firms out. If the firms’ wages do not also increase, then firms can increase their profits by raising prices and increasing output. In other words, the response of the overall economy to the aggregate demand increase will be an increase in output and the price level—a positive slope of the short-run AS curve.

A key assumption in this story is that firms’ wages and thus their marginal cost curves do not also shift. A key input into the production processes of firms is labor, and labor costs are a large fraction of total costs. If wages do not respond quickly to price increases, there may be some period of time in which firms raise prices without seeing wage rates rise. In practice, wages do tend to lag behind prices. We discuss in the next chapter various reasons that have been advanced for why wages might be “sticky” in the short run. If wages are sticky in the short run in the sense that wages lag behind prices, this is a reason for an upward-sloping short-run AS curve. Firms’ demand curves will shift without a corresponding shift in their marginal cost curves.

We should add a word of caution at this point. It may be that some of a firm’s input costs are rising even in the short run after the aggregate demand increase has taken place because some of a firm’s inputs may be purchased from other firms who are raising prices. For example, one input to a Dell computer is a chip produced by Intel or AMD. The fact that some of a firm’s input costs rise along with a shift in the demand for its product complicates the picture because it means that at the same time there is an outward shift in a firm’s demand curve, there is some upward shift in its marginal cost curve. In deriving an upward-sloping AS curve, we are in effect assuming that these kinds of input costs are small relative to wage costs. So the story is that wages are a large fraction of total costs and that wage changes lag behind price changes. This gives us an upward-sloping short-run AS curve.

Why the Particular Shape? Notice the AS curve in Figure 28.1 begins with a flat section and ends with a more or less vertical section. Why might the AS curve have this shape? Consider the vertical portion first. At some level the overall economy is using all its capital and all the labor that wants to work at the market wage. At this level (Y*), increased demand for output can be met only by increased prices and similarly for increased demand for labor. Neither wages nor prices are likely to be sticky at this level of economic activity.

What about the flat portion of the curve? Here we are at levels of output that are low relative to historical levels. Many firms are likely to have excess capacity in terms of their plant and equipment and their workforce. With excess capacity, firms may be able to increase output from A to B without a proportionate cost increase. (In later chapters we will see that labor productivity usually increases following a recession.) Small price increases may thus be associated with relatively large output responses. We may also observe relatively sticky wages upward at this point on the AS curve if firms have held any excess workers in the downturn as a way to preserve worker morale.

Shifts of the Short-Run Aggregate Supply Curve

Think now about shifts of the AS curve. A rightward shift in the AS curve indicates that society can get a larger aggregate output at a given price level. What might cause such a shift? Clearly, if a society had an increase in labor or capital, the AS curve would shift to the right. In either case, the marginal costs of production in the society would fall as more inputs were available at given input prices to produce output. Similarly, technical changes that increased productivity would also shift the AS curve to the right by lowering marginal costs of production in the economy. Recall that the vertical part of the short-run AS curve represents the economy’s maximum (capacity) output. This maximum output is determined by the

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1 This is a standard result in microeconomics. An outward demand shift for an imperfectly competitive firm with an unchanged marginal cost curve leads the firm to raise its price and its quantity produced. In the perfectly competitive case the industry output price is determined in the market, and firms take this price as given in deciding how much output to produce. If aggregate demand increases and results in a larger industry output price and if there is no increase in firms’ costs, they will respond by increasing output. There will thus be an increase in both industry output prices and output, resulting in a positive sloping short-run AS curve.
The Core of Macroeconomic Theory

The labor force grows naturally with an increase in the working-age population, but it can also increase for other reasons. Since the 1960s, for example, the percentage of women in the labor force has grown sharply. This increase in the supply of women workers has shifted the AS curve to the right. Immigration can also shift the AS curve. During the 1970s, Germany, faced with a serious labor shortage, opened its borders to large numbers of “guest workers,” largely from Turkey. The United States has experienced significant immigration, legal and illegal, from Mexico, from Central and South American countries, and from Asia. (We discuss economic growth in more detail in Chapter 32.)

We have focused on labor and capital as factors of production, but for a modern economy, energy is also an important input. New discoveries of oil or problems in the production of energy can also shift the AS curve through effects on the marginal cost of production in many parts of the economy.

Figures 28.2(a) and (b) show the effects of shifts in the short-run AS curve coming from changes in wage rates or energy prices. This type of shift is sometimes called a cost shock or supply shock. Oil has historically had quite volatile prices and has often been thought to contribute to shifts in the AS curve that, as we will shortly see, contribute to economy-wide fluctuations.

The Equilibrium Price Level

The equilibrium price level in the economy occurs at the point at which the AD curve and the AS curve intersect, shown in Figure 28.3, where the equilibrium price level is $P_0$ and the equilibrium level of aggregate output (income) is $Y_0$.

Figure 28.3 looks simple, but it is a powerful device for analyzing a number of macroeconomic questions. Consider first what is true at the intersection of the AS and AD curves. Each point on the AD curve corresponds to equilibrium in both the goods market and the money market. Each point on the AS curve represents the price/output responses of all the firms in the economy. That means that the point at which the AS and AD curves intersect corresponds to equilibrium in the goods and money markets and to a set of price/output decisions on the part of all the firms in the economy.

We will use this AS/AD framework to analyze the effects of monetary and fiscal policy on the economy and to analyze the causes of inflation. For example, what can Trichet and Bernanke do
if they are worried about inflation? To answer these kinds of questions, we need to return to the AS curve and discuss its shape in the long run.

The Long-Run Aggregate Supply Curve

We derived the short-run AS curve under the assumption that wages were sticky. This does not mean, however, that stickiness persists forever. Over time, wages adjust to higher prices. When workers negotiate with firms over their wages, they take into account what prices have been doing in the recent past. If wages fully adjust to prices in the long run, then the long-run AS curve will be vertical. We can see why in Figure 28.4. Initially, the economy is in equilibrium at a price level of $P_0$ and aggregate output of $Y_0$ (the point A at which $AD_0$ and $AS_0$ intersect). Now imagine a shift of the $AD$ curve from $AD_0$ to $AD_1$. In response to this shift, both the price level and aggregate output rise in the short run, to $P_1$ and $Y_1$, respectively (the point B at which $AD_1$ and $AS_0$ intersect). The movement along the upward-sloping $AS_0$ curve as $Y$ increases from $Y_0$ to $Y_1$ assumes that wages lag prices.

Now, as wages increase the short-run AS curve shifts to the left. If wages fully adjust, the AS curve will over time have shifted from $AS_0$ to $AS_1$ in Figure 28.4, and output will be back to $Y_0$ (the point C at which $AD_1$ and $AS_1$ intersect). So when wages fully adjust to prices, the long-run AS curve is vertical.

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**FIGURE 28.3**

The Equilibrium Price Level

At each point along the $AD$ curve, both the money market and the goods market are in equilibrium. Each point on the $AS$ curve represents the price/output decisions of all the firms in the economy. $P_0$ and $Y_0$ correspond to equilibrium in the goods market and the money market and to a set of price/output decisions on the part of all the firms in the economy.

**FIGURE 28.4**

The Long-Run Aggregate Supply Curve

When the $AD$ curve shifts from $AD_0$ to $AD_1$, the equilibrium price level initially rises from $P_0$ to $P_1$ and output rises from $Y_0$ to $Y_1$. Wages respond in the longer run, shifting the AS curve from $AS_0$ to $AS_1$. If wages fully adjust, output will be back at $Y_0$. $Y_0$ is sometimes called potential GDP.
There is a great deal of disagreement concerning the shape of the AS curve. One view of the aggregate supply curve, the simple “Keynesian” view, holds that at any given moment, the economy has a clearly defined capacity, or maximum, output. This maximum output, denoted by $Y_F$, is defined by the existing labor force, the current capital stock, and the existing state of technology. If $AE$ is producing below this maximum capacity, this view holds, inventories will be lower than planned, and firms will increase output, but the price level will not change. Firms are operating with underutilized plants (excess capacity), and there is cyclical unemployment. Expansion does not exert any upward pressure on prices. However, if $AE$ increases when the economy is producing near or at its maximum ($Y_F$), inventories will be lower than planned, but firms cannot increase their output. The result will be an increase in the price level, or inflation.

This view is illustrated in the figure. In the top half of the diagram, aggregate output (income) ($Y$) and planned aggregate expenditure ($C + I + G = AE$) are initially in equilibrium at $AE_1$, $Y_1$, and price level $P_1$. Now suppose a tax cut or an increase in government spending increases planned aggregate expenditure. If such an increase shifts the $AE$ curve from $AE_1$ to $AE_2$ and the corresponding aggregate demand curve from $AD_1$ to $AD_2$, the equilibrium level of output will rise from $Y_1$ to $Y_F$. (Remember, an expansionary policy shifts the $AD$ curve to the right.) Because we were initially producing below capacity output ($Y_1$ is lower than $Y_F$), the price level will be unaffected, remaining at $P_1$.

Now consider what would happen if $AE$ increased even further. Suppose planned aggregate expenditure shifted from $AE_2$ to $AE_3$, with a corresponding shift of $AD_2$ to $AD_3$. If the economy were producing below capacity output, the equilibrium level of output would rise to $Y_F$. However, the output of the economy cannot exceed the maximum output of $Y_F$. As inventories fall below what was planned, firms encounter a fully employed labor market and fully utilized plants. Therefore, they cannot increase their output. The result is that the aggregate supply curve becomes vertical at $Y_F$, and the price level is driven up to $P_3$.

The difference between planned aggregate expenditure and aggregate output at full capacity is sometimes referred to as an inflationary gap. You can see the inflationary gap in the top half of the figure. At $Y_F$ (capacity output), planned aggregate expenditure (shown by $AE_3$) is greater than $Y_F$. The price level rises to $P_3$ until the aggregate quantity demanded are equal.

Despite the fact that the kinked aggregate supply curve provides some insights, most economists find it unrealistic. It does not seem likely that the whole economy suddenly runs into a capacity “wall” at a specific level of output. As output expands, some firms and industries will hit capacity before others.

By looking at Figure 28.4, you can begin to see why arguments about the shape of the AS curve are so important in policy debates. If the long-run AS curve is vertical as we have drawn it, factors that shift the $AD$ curve to the right—including policy actions such as increasing government spending—simply end up increasing the price level. If the short-run AS curve also is quite steep, even in the short run, most of the effect of any shift in the $AD$ curve will be felt in an increase in the price level rather than an increase in aggregate output. If the $AS$ curve, on the other hand, is flat, $AD$ shifts can have a large effect on aggregate output, at least in the short run. We discuss these effects of policy in more detail later in this chapter.

**Potential GDP**

Recall that even the short-run AS curve becomes vertical at some particular level of output. The vertical portion of the short-run AS curve exists because there are physical limits to the amount that an economy can produce in any given time period. At the physical limit, all
plants are operating around the clock, many workers are on overtime, and there is no cyclical unemployment.

Note that the vertical portions of the short-run AS curves in Figure 28.4 on p. 563 are to the right of \( Y_0 \). If the vertical portions of the short-run AS curves represent “capacity,” what is the nature of \( Y_0 \), the level of output corresponding to the long-run AS curve? \( Y_0 \) represents the level of aggregate output that can be sustained in the long run without inflation. It is sometimes called potential output or potential GDP. Output can be pushed above \( Y_0 \) under a variety of circumstances, but when it is, there is upward pressure on wages. As the economy approaches short-run capacity, wage rates tend to rise as firms try to attract more people into the labor force and to induce more workers to work overtime. Rising wages shift the short-run AS curve to the left (in Figure 28.4 from \( AS_0 \) to \( AS_1 \)) and drive output back to \( Y_0 \).

**Short-Run Equilibrium Below Potential Output** Thus far we have argued that if the short-run aggregate supply and aggregate demand curves intersect to the right of \( Y_0 \) in Figure 28.4, wages will rise, causing the short-run AS curve to shift to the left and pushing aggregate output back down to \( Y_0 \). Although different economists have different opinions on how to determine whether an economy is operating at or above potential output, there is general agreement that there is a maximum level of output (below the vertical portion of the short-run aggregate supply curve) that can be sustained without inflation.

What about short-run equilibria that occur to the left of \( Y_0 \)? If the short-run aggregate supply and aggregate demand curves intersect at a level of output below potential output, what will happen? Here again economists disagree. Those who believe the aggregate supply curve is vertical in the long run believe that when short-run equilibria exist below \( Y_0 \), output will tend to rise—just as output tends to fall when short-run equilibria exist above \( Y_0 \). The argument is that when the economy is operating below full employment with excess capacity and high unemployment, wages are likely to fall. A decline in wages shifts the aggregate supply curve to the right, causing the price level to fall and the level of aggregate output to rise back to \( Y_0 \). This automatic adjustment works only if wages fall when excess capacity and unemployment exist. We will discuss wage adjustment during periods of unemployment in detail in Chapter 29.

**Monetary and Fiscal Policy Effects**

We are now ready to use the AS/AD framework to consider the effects of monetary and fiscal policy. We will first consider the short-run effects.

Recall that the two fiscal policy variables are government purchases (\( G \)) and net taxes (\( T \)). The monetary policy variable is the quantity of money supplied (\( M^p \)). An expansionary policy aims at stimulating the economy through an increase in \( G \) or \( M^p \) or a decrease in \( T \). A contractionary policy aims at slowing down the economy through a decrease in \( G \) or \( M^p \) or an increase in \( T \). We saw earlier in this chapter that an expansionary policy shifts the \( AD \) curve to the right and that a contractionary policy shifts the \( AD \) curve to the left. How do these policies affect the equilibrium values of the price level (\( P \)) and the level of aggregate output (income)?

When considering the effects of a policy change, we must be careful to note where along the (short-run) AS curve the economy is at the time of the change. If the economy is initially on the flat portion of the AS curve, as shown by point \( A \) in Figure 28.5, an expansionary policy, which shifts the \( AD \) curve to the right, will result in a small price increase relative to the output increase: The increase in equilibrium \( Y \) (from \( Y_0 \) to \( Y_1 \)) is much greater than the increase in equilibrium \( P \) (from \( P_0 \) to \( P_1 \)). This is the case in which an expansionary policy works well. There is an increase in output with little increase in the price level.

If the economy is initially on the steep portion of the AS curve, as shown by point \( B \) in Figure 28.6, an expansionary policy will result in a small increase in equilibrium output (from \( Y_0 \) to \( Y_1 \)) and a large increase in the equilibrium price level (from \( P_0 \) to \( P_1 \)). In this case, an expansionary policy does not work well. It results in a much higher price level with little increase in output. The multiplier is therefore close to zero: Output is initially close to capacity, and attempts to increase it further lead mostly to a higher price level.

Figures 28.5 and 28.6 show that it is important to know where the economy is before a policy change is put into effect. The economy is producing on the nearly flat part of the AS curve when
A Shift of the Aggregate Demand Curve When the Economy Is on the Nearly Flat Part of the AS Curve

Aggregate demand can shift to the right for a number of reasons, including an increase in the money supply, a tax cut, or an increase in government spending. If the shift occurs when the economy is on the nearly flat portion of the AS curve, the result will be an increase in output with little increase in the price level from point $A$ to point $A'$. Most firms are producing well below capacity. When this is the case, firms will respond to an increase in demand by increasing output much more than they increase prices. When the economy is producing on the steep part of the AS curve, firms are close to capacity and will respond to an increase in demand by increasing prices much more than they increase output.

To see what happens when the economy is on the steep part of the AS curve, consider the effects of an increase in $G$ with no change in the money supply. What will happen is that when $G$ is increased, there will be virtually no increase in $Y$. In other words, the expansionary fiscal policy will fail to stimulate the economy. To consider this, we need to go back to Chapter 27 and review what is behind the AD curve.

The first thing that happens when $G$ increases is an unanticipated decline in firms’ inventories. Because firms are very close to capacity output when the economy is on the steep part of the AS curve, they cannot increase their output very much. The result, as Figure 28.6 shows, is a substantial increase in the price level. The increase in the price level increases the demand for money, which (with a fixed money supply) leads to an increase in the interest rate, decreasing planned investment. There is nearly complete crowding out of investment. If firms are producing at capacity, prices and interest rates will continue to rise until the increase in $G$ is completely matched by a decrease in planned investment and there is complete crowding out.
Long-Run Aggregate Supply and Policy Effects

We have so far been considering monetary and fiscal policy effects in the short run. It is important to realize that if the AS curve is vertical in the long run, neither monetary policy nor fiscal policy has any effect on aggregate output in the long run. Look back at Figure 28.4 on p. 563. Monetary and fiscal policy shift the AD curve. If the long-run AS curve is vertical, output always comes back to $Y_0$. In this case, policy affects only the price level in the long run and the multiplier effect of a change in government spending on aggregate output in the long run is zero. Under the same circumstances, the tax multiplier is also zero.

The conclusion that policy has no effect on aggregate output in the long run is perhaps startling. Do most economists agree that the aggregate supply curve is vertical in the long run? Most economists agree that wages tend to lag behind output prices in the short run, giving the AS curve some positive slope. Most also agree the AS curve is likely to be steeper in the long run, but how long is the long run? The longer the lag time, the greater the potential impact of monetary and fiscal policy on aggregate output. If wages follow output prices within, say, 3 to 6 months, policy has little chance to affect output. If the long run is 3 or 4 years, policy can have significant effects. A good deal of research in macroeconomics focuses on the length of time lags between wages and output prices. In a sense, the length of the long run is one of the most important open questions in macroeconomics.

Another source of disagreement centers on whether equilibria below potential output, $Y_0$ in Figure 28.4, are self-correcting (that is, without government intervention). Recall that those who believe in a vertical long-run AS curve believe that slack in the economy will put downward pressure on wages, causing the short-run AS curve to shift to the right and pushing aggregate output back toward $Y_0$. However, some argue that wages do not fall during slack periods and that the economy can get “stuck” at an equilibrium below potential output. In this case, monetary and fiscal policy would be necessary to restore full employment. We will return to this debate in Chapter 29.

The “new classical” economics, which we will discuss in Chapter 33, assumes that prices and wages are fully flexible and adjust very quickly to changing conditions. New classical economists believe, for example, that wage rate changes do not lag behind price changes. The new classical view is consistent with the existence of a vertical AS curve, even in the short run. At the other end of the spectrum is what is sometimes called the simple “Keynesian” view of aggregate supply. Those who hold this view believe there is a kink in the AS curve at capacity output, as we discussed in Economics in Practice, “The Simple ‘Keynesian’ Aggregate Supply Curve.”

Causes of Inflation

We now turn to inflation and use the AS/AD framework to consider the causes of inflation.

Demand-Pull Inflation

Inflation initiated by an increase in aggregate demand is called demand-pull inflation. You can see how demand-pull inflation works by looking at Figures 28.5 and 28.6. In both, the inflation begins with a shift of the aggregate demand schedule from $AD_0$ to $AD_1$, which causes the price level to increase from $P_0$ to $P_1$. (Output also increases, from $Y_0$ to $Y_1$.) If the economy is operating on the steep portion of the AS curve at the time of the increase in aggregate demand, as in Figure 28.6, most of the effect will be an increase in the price level instead of an increase in output. If the economy is operating on the flat portion of the AS curve, as in Figure 28.5, most of the effect will be an increase in output instead of an increase in the price level.

Remember, in the long run the initial increase in the price level will cause the AS curve to shift to the left as wages respond to the increase in output prices. If the long-run AS curve is vertical, as depicted in Figure 28.4, the increase in wages will shift the short-run AS curve ($AS_0$) to the left to $AS_1$, pushing the price level even higher, to $P_2$. If the long-run AS curve is vertical, a shift in aggregate demand from $AD_0$ to $AD_1$ will result, in the long run, in no increase in output and a price-level increase from $P_0$ to $P_2$. demand-pull inflation Inflation that is initiated by an increase in aggregate demand.
Cost-Push, or Supply-Side, Inflation

Inflation can also be caused by an increase in costs, referred to as cost-push, or supply-side, inflation. Several times in the last three decades oil prices in world markets increased sharply. Because oil is used in virtually every line of business, costs increased.

An increase in costs (a cost shock) shifts the AS curve to the left, as Figure 28.7 shows. If we assume the government does not react to this shift in AS by changing fiscal or monetary policy, the AD curve will not shift. The supply shift will cause the equilibrium price level to rise (from $P_0$ to $P_1$) and the level of aggregate output to decline (from $Y_0$ to $Y_1$). Recall from Chapter 20 that stagflation occurs when output is falling at the same time prices are rising—in other words, when the economy is experiencing both a contraction and inflation simultaneously. Figure 28.7 shows that one possible cause of stagflation is an increase in costs.

To return to monetary and fiscal policy for a moment, note from Figure 28.7 that the government could counteract the increase in costs (the cost shock) by engaging in an expansionary policy (an increase in $G$ or $M^t$ or a decrease in $T$). This would shift the AD curve to the right, and the new AD curve would intersect the new AS curve at a higher level of output. The problem with this policy, however, is that the intersection of the new AS and AD curves would take place at a price even higher than $P_1$ in Figure 28.7. Cost shocks are thus bad news for policy makers. The only way they can counter the output loss brought about by a cost shock is by having the price level increase even more than it would without the policy action. This situation is illustrated in Figure 28.8.

Expectations and Inflation

When firms are making their price/output decisions, their expectations of future prices may affect their current decisions. If a firm expects that its competitors will raise their prices, in anticipation, it may raise its own price.

Consider a firm that manufactures toasters in an imperfectly competitive market. The toaster maker must decide what price to charge retail stores for its toaster. If it overestimates price and charges much more than other toaster manufacturers are charging, it will lose many customers. If it underestimates price and charges much less than other toaster makers are charging, it will gain customers but at a considerable loss in revenue per sale. The firm's optimum price—the price that maximizes the firm's profits—is presumably not too far from the average of its competitors' prices. If it does not know its competitors' projected prices before it sets its own price, as is often the case, it must base its price on what it expects its competitors' prices to be.

Suppose inflation has been running at about 10 percent per year. Our firm probably expects its competitors will raise their prices about 10 percent this year, so it is likely to raise the price of...
its own toaster by about 10 percent. This response is how expectations can get “built into the system.” If every firm expects every other firm to raise prices by 10 percent, every firm will raise prices by about 10 percent. Every firm ends up with the price increase it expected.

The fact that expectations can affect the price level is vexing. Expectations can lead to an inertia that makes it difficult to stop an inflationary spiral. If prices have been rising and if people’s expectations are adaptive—that is, if they form their expectations on the basis of past pricing behavior—firms may continue raising prices even if demand is slowing or contracting. In terms of the AS/AD diagram, an increase in inflationary expectations that causes firms to increase their prices shifts the AS curve to the left. Remember that the AS curve represents the price/output responses of firms. If firms increase their prices because of a change in inflationary expectations, the result is a leftward shift of the AS curve.

Given the importance of expectations in inflation, the central banks of many countries survey consumers about their expectations. In Great Britain, for example, a survey of consumers by the Bank of England found a rise in expectations of inflation from 3.9 percent in February 2008 to 4.9 percent in May 2008. One of the aims of central banks is to try to keep these expectations low.

**Money and Inflation**

It is easy to see that an increase in the money supply can lead to an increase in the aggregate price level. As Figures 28.5 and 28.6 show, an increase in the money supply ($M'$) shifts the AD curve to the right and results in a higher price level. This is simply a demand-pull inflation.

However, the supply of money may also play a role in creating inflation that persists over a long period of time, which we will call a “sustained” inflation. Consider an initial increase in government spending ($G$) with the money supply ($M'$) unchanged. Because the money supply is unchanged, this is an increase in $G$ that is not “accommodated” by the Fed. The increase in $G$ shifts the AD curve to the right and results in a higher price level. This is shown in Figure 28.9 as a shift from $AD_0$ to $AD_1$. (In Figure 28.9, the economy is assumed to be operating on the vertical portion of the AS curve.)

Remember what happens when the price level increases. The higher price level causes the demand for money to increase. With an unchanged money supply and an increase in the quantity of money demanded, the interest rate will rise and the result will be a decrease in planned investment ($I$) spending. The new equilibrium corresponds to higher $G$, lower $I$, a higher interest rate, and a higher price level.

Now let us take our example one step further. Suppose that the Fed is sympathetic to the expansionary fiscal policy (the increase in $G$ we just discussed) and decides to expand the supply of money to keep the interest rate constant. As the higher price level pushes up the demand for money, the Fed expands the supply of money with the goal of keeping the interest rate unchanged, eliminating the crowding-out effect of a higher interest rate.
The text describes ways in which expectations that prices will rise can be self-fulfilling as firms raise prices in expectation that all other prices will rise. In the following article, this same phenomenon is discussed in the context of China. It is also interesting to note that many people believed the official statistics on inflation understated their own experience. This is quite like the sentiment of the pensioner in Maryland highlighted in the *Economics in Practice* in Chapter 22 who thought that the BLS’s inflation index underestimated her cost increases!

**Inflation Perceptions Run High in China**

*The Wall Street Journal*

A new poll by Horizon Research Consultancy Group, China’s largest polling firm, finds 60.8% of respondents believe China is experiencing “serious” inflation, a disquieting finding which suggests China’s inflation problem may be more severe than official statistics indicate.

Public perceptions of inflation are important, because inflationary expectations can become self-fulfilling. If consumers anticipate future price rises, they may accelerate their planned purchases, and may take savings out of low-yielding investments like bank deposits, thus adding to inflationary pressures.

Over 77% of respondents to the Horizon poll said they expect prices to rise further over the next year, with 57.7% saying they expect “stable increases” while a not-insignificant 19.5% expect “large increases.” Interestingly, only 45% of those polled felt China’s official inflation expectations reflect their personal experience, while 44.7% felt they did not, suggesting that many members of the public feel the official statistics understate the extent of price rises.

The results are consistent with a central bank survey of bank depositors released last week. The People’s Bank of China found that 58.9% of depositors described the overall price level as “high and difficult to accept,” a 10-year high. In the survey, 70.3% of depositors expected prices to be higher in the second quarter than in the first.


When the supply of money is expanded, the $AD$ curve shifts to the right again, from $AD_1$ to $AD_2$. This shift of the $AD$ curve, brought about by the increased money supply, pushes prices up even further. Higher prices, in turn, increase the demand for money further, which requires a further increase in the money supply and so on.

What would happen if the Fed tried to keep the interest rate constant when the economy was operating on the steep part of the $AS$ curve? The situation could lead to a hyperinflation, a period of very rapid increases in the price level. If no more output can be coaxed out of the economy and if planned investment is not allowed to fall (because the interest rate is kept unchanged), it is not

**FIGURE 28.9**

**Sustained Inflation from an Initial Increase in $G$ and Fed Accommodation**

An increase in $G$ with the money supply constant shifts the $AD$ curve from $AD_0$ to $AD_1$. Although not shown in the figure, this leads to an increase in the interest rate and crowding out of planned investment. If the Fed tries to keep the interest rate unchanged by increasing the money supply, the $AD$ curve will shift farther and farther to the right. The result is a sustained inflation, perhaps even hyperinflation.
possible to increase $G$. As the Fed keeps pumping more and more money into the economy to keep the interest rate unchanged, the price level will keep rising.

**Sustained Inflation as a Purely Monetary Phenomenon**

Virtually all economists agree that an increase in the price level can be caused by anything that causes the $AD$ curve to shift to the right or the $AS$ curve to shift to the left. These include expansionary fiscal policy actions, monetary expansion, cost shocks, changes in expectations, and so on. It is also generally agreed that for a sustained inflation to occur, the Fed must accommodate it. In this sense, a sustained inflation can be thought of as a purely monetary phenomenon.

This argument, first put forth by monetarists (coming in Chapter 33), has gained wide acceptance. It is easy to show, as we just did, how expanding the money supply can continuously shift the $AD$ curve. It is not as easy to come up with other reasons for continued shifts of the $AD$ curve if the money supply is constant. One possibility is for the government to increase spending continuously without increasing taxes, but this process cannot continue forever. To finance spending without taxes, the government must borrow. Without any expansion of the money supply, the interest rate will rise dramatically because of the increase in the supply of government bonds. The public must be willing to buy the government bonds that are being issued to finance the spending increases. At some point, the public may be unwilling to buy any more bonds even though the interest rate is very high. At this point, the government is no longer able to increase non-tax-financed spending without the Fed’s cooperation. If this is true, a sustained inflation cannot exist without the Fed’s cooperation.

**The Behavior of the Fed**

We have so far in this book talked about monetary policy as consisting of changes in the money supply ($M^*$), which affects the interest rate ($r$). We saw in Chapter 25 that the Fed can change the money supply by (1) changing the required reserve ratio, (2) changing the discount rate, and (3) engaging in open market operations (buying and selling government securities). We also pointed out that the main way in which the Fed changes the money supply is by engaging in open market operations. Through these operations the Fed can achieve whatever value of the money supply it wants.

We must add two key points to the monetary policy story to make the story realistic, as we do in this section. The first point is that in practice, the Fed targets the interest rate rather than the money supply. The second point is that the interest rate value that the Fed chooses depends on the state of the economy. We will first explain these two points and then turn to a discussion of actual Fed policy from 1970 on. Figure 28.10 outlines how the Fed behaves in practice. It will be useful to keep this figure in mind in the following discussion.

**Targeting the Interest Rate**

In Chapter 26 we described the way in which the Fed changes the money supply by buying and selling government securities. We noted that a change in the money supply led to a change in the interest rate as the new money supply curve intersected with the existing money demand curve. Increases in the money supply reduced interest rates, while decreases in the money supply raised rates. The steeper the money demand curve, the larger the effect of a money supply change on rates.

In the earlier chapters we worked through these changes by focusing on the money supply as the Fed instrument. In practice, however, the actual variable of interest to the Fed is not the money supply, but the interest rate. In practice, it is the interest rate that directly affects economic activity, for example, by affecting firms’ decisions about investing. Targeting the interest rate thus gives the Fed more control over the key variable that matters to the economy.

The Federal Open Market Committee (FOMC) meets every 6 weeks and sets the value of the interest rate. It then instructs the Open Market Desk at the New York Federal Reserve Bank to keep buying or selling government securities until the desired interest rate value is achieved.

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2 This means that the public’s demand for money no longer depends on the interest rate. Even though the interest rate is very high, the public cannot be induced to have its real money balances fall any farther. There is a limit concerning how much the public can be induced to have its real money balances fall.
The FOMC announces the interest rate value at 2:15 P.M. eastern time on the day it meets. This is a key time for financial markets around the world. At 2:14 P.M., thousands of people are staring at their computer screens waiting for the word from on high. If the announcement is a surprise, it can have very large and immediate effects on bond and stock markets.

For most of the rest of this text, we will talk about monetary policy as being a change in the interest rate. Keep in mind, of course, that monetary policy also changes the money supply. We can talk about an expansionary monetary policy as one in which the money supply is increased or one in which the interest rate is lowered. We will talk about the interest rate being lowered because the interest rate is what the Fed targets in practice. However we talk about it, an expansionary monetary policy is achieved by the Fed’s buying government securities.

The Fed’s Response to the State of the Economy

When the FOMC meets every 6 weeks to set the value of the interest rate, it does not set the value in a vacuum. An important question in macroeconomics is what influences the interest rate decision. To answer this, we must consider the main goals of the Fed. What ultimately is the Fed trying to achieve?

The Fed’s main goals are high levels of output and employment and a low rate of inflation. From the Fed’s point of view, the best situation is a fully employed economy with an inflation rate near zero. The worst situation is stagflation—high unemployment and high inflation.

If the economy is in a low output/low inflation situation, it will be producing on the relatively flat portion of the aggregate supply (AS) curve (Figure 28.11). In this case, the Fed can increase output by lowering the interest rate (and thus increasing the money supply) with little effect on the price level. The expansionary monetary policy will shift the aggregate demand (AD) curve to the right, leading to an increase in output with little change in the price level. The Fed is likely to lower the interest rate (and thus increase the money supply) during times of low output and low inflation.

The opposite is true in times of high output and high inflation. In this situation, the economy is producing on the relatively steep portion of the AS curve (Figure 28.12), and the Fed can increase the interest rate (and thus decrease the money supply) with little effect on output. The contractionary monetary policy will shift the AD curve to the left, which will lead to a fall in the price level and little effect on output. The Fed is likely to increase the interest rate (and thus
CHAPTER 28 Aggregate Supply and the Equilibrium Price Level

ECONOMICS IN PRACTICE

Markets Watch the Fed

In the text we have described the impact that decisions by the Federal Reserve to increase or decrease interest rates have on the economy as a whole. One measure of how important interest rates are to the health of the economy is the attention paid to Fed actions by the private sector, including prominently the major investment banks. All of the major investment banks employ economists to help them forecast what the Fed will do. As the following article indicates, these economists have been especially active in the recent period as there has been more uncertainty about whether the Fed might begin to tighten (raise interest rates) as the U.S. economy recovers.

J.P. Morgan Pushes Back Rate Hike Forecast to Late 2011
The Wall Street Journal

J.P. Morgan’s economists are pushing back their expectations of when the Federal Reserve will raise interest rates as next week’s central bank meeting quickly approaches.

Bank economist Michael Feroli told clients Thursday his bank now expects the Fed to first raise rates in the fourth quarter of 2011, rather than the second quarter. “The prime motivation for the change is the behavior of inflation,” the economist wrote.

“While we have been expecting core inflation to fall below 1%, the degree to which this has been located in the more persistent service price component, as well as the extent to which wage inflation has slowed, both suggest the disinflation we have witnessed could be with us for some time,” Feroli said.

Pushing back estimates of rate hikes has been in fashion on Wall Street over recent weeks. Central bankers meet next week in a gathering that’s almost certain to result in the overnight target rate left at its effectively 0% stance.

Economists have looked at the economy’s moderate and uneven growth rates, joined with anemic job gains, and concluded the central bank faces no urgency in raising rates. Meanwhile, central bankers have done little to disabuse markets of the expectation that any rate hikes lie well off in the distance: Feroli noted his forecast shift is “supported by, though not motivated by, the rhetoric of Fed leadership.”

Economists at UBS also recently changed their estimate of Fed action, delaying the expectation of a tightening in rates until the late January 2011 Federal Open Market Committee meeting. They had thought the move would come in September. UBS took action largely out of concern that the financial distress in Europe would create trouble and uncertainty for the U.S. economy, which in turn argues for continued central bank support for growth.


decrease the money supply) during times of high output and high inflation. In this discussion, we see again the role of the shape of AS curve in determining the likely effect of government policy.

Stagflation is a more difficult problem to solve. If the Fed lowers the interest rate, output will rise, but so will the inflation rate (which is already too high). If the Fed increases the interest rate, the inflation rate will fall, but so will output (which is already too low). (You should be able to draw AS/AD diagrams to see why this is true.) The Fed is faced with a trade-off. In this case, the

FIGURE 28.11
The Fed’s Response to Low Output/Low Inflation

During periods of low output/low inflation, the economy is on the relatively flat portion of the AS curve. In this case, the Fed is likely to lower the interest rate (and thus expand the money supply). This will shift the AD curve to the right, from AD₀ to AD₁, and lead to an increase in output with very little increase in the price level.
The Core of Macroeconomic Theory

Fed is likely to increase the interest rate (and thus contract the money supply). This will shift the \( AD \) curve to the left, from \( AD_0 \) to \( AD_1 \), and lead to a decrease in the price level with very little decrease in output.

Fed’s decisions depend on how it weights output relative to inflation. If it dislikes high inflation more than low output, it will increase the interest rate; if it dislikes low output more than high inflation, it will lower the interest rate. In practice, the Fed probably dislikes high inflation more than low output, but how the Fed behaves depends in part on the beliefs of the chair of the Fed.

The Fed is sometimes said to “lean against the wind,” meaning that as the economy expands, the Fed uses open market operations to raise the interest rate gradually to try to prevent the economy from expanding too quickly. Conversely, as the economy contracts, the Fed lowers the interest rate gradually to lessen (and eventually stop) the contraction.

**Fed Behavior Since 1970**

Figure 28.13 plots three variables that can be used to describe Fed behavior since 1970. The interest rate is the 3-month Treasury bill rate, which moves closely with the interest rate that the Fed actually targets, which is the federal funds rate. For simplicity, we will take the 3-month Treasury bill rate to be the rate that the Fed targets and we will just call it “the interest rate.” Inflation is the percentage change in the GDP deflator over the previous 4 quarters. This variable is also plotted in Figure 20.6 on p. 420. Output is the percentage deviation of real GDP from its trend. (Real GDP itself is plotted in Figure 20.4 on p. 418.) It is easier to see fluctuations in real GDP by looking at percentage deviations from its trend.

Recall from Chapter 20 that we have called five periods since 1970 “recessionary periods” and two periods “high inflation periods.” These periods are highlighted in Figure 28.13. The recessionary and high inflation periods have considerable overlap in the last half of the 1970s and early 1980s. After 1981, there are no more high inflation periods and three more recessionary periods. There is thus some stagflation in the early part of the period since 1970 but not in the later part.

We know from earlier in this chapter that stagflation is bad news for policy makers. Should the Fed raise the interest rate to lessen inflation at a cost of making the output situation worse, or should it lower the interest rate to help output growth at a cost of making inflation worse? What did the Fed actually do? You can see from Figure 28.13 that the Fed generally raised the interest rate when inflation was high—even when output was low. In particular, the interest rate was very high in the 1979–1983 period even though output was low. Had the Fed not had such high interest rates in this period, the recession would likely have been less severe, but inflation would have been even worse.

After inflation got back down to about 4 percent in 1983, the Fed began lowering the interest rate, which helped output. The Fed increased the interest rate in 1988 as inflation began to pick up a little and output was strong. The Fed acted aggressively in lowering the interest rate during the 1990–1991 recession and again in the 2001 recession. The Treasury bill rate got below 1 percent in 2003. The Fed then reversed course, and the interest rate rose to nearly 5 percent in 2006. The Fed then reversed course again near the end of 2007 and began lowering the interest rate in an effort to fight a recession that it expected was coming. The recession did come, and the Fed lowered the interest rate to near zero beginning in 2008 IV.
Fed behavior in the period since 1970 is thus fairly easy to summarize. The Fed generally had high interest rates in the 1970s and early 1980s as it fought inflation. Since 1983, inflation has been low by historical standards, and the Fed focused in this period on trying to smooth fluctuations in output.

**Interest Rates Near Zero**

As just noted, the Fed lowered the short-term interest rate to near zero beginning in 2008 IV. Since interest rates cannot go below zero, the ability of the Fed to stimulate the economy when interest rates are zero is severely limited. Its main way of stimulating the economy is to lower interest rates, which stimulates plant and equipment investment as well as consumption of durable goods and housing investment. This option is not available when interest rates are near zero. In this case stimulus must come primarily from fiscal policy.

In 2010 the Fed was in an even worse position than the existence of a near zero interest rate might suggest. We saw in Chapter 26 that commercial banks held an enormous quantity of excess reserves—over $900 billion—in the middle of 2010. The Fed had tried to stimulate bank lending by buying mortgage-backed securities—replacing mortgage-backed securities held by the private sector with reserves that could be loaned out. In practice, the banks just held the reserves as excess reserves. Therefore, in 2010 the Fed could neither stimulate by lowering interest rates because they were near zero nor stimulate bank lending by buying mortgage-backed securities because the banks just held the reserves this created as excess reserves.
Inflation Targeting

Some monetary authorities in the world engage in what is called inflation targeting. If a monetary authority behaves this way, it announces a target value of the inflation rate, usually for a horizon of a year or more, and then it chooses its interest rate values with the aim of keeping the actual inflation rate within some specified band around the target value. For example, the target value might be 2 percent with a band of 1 to 3 percent. Then the monetary authority would try to keep the actual inflation rate between 1 and 3 percent. With a horizon of a year or more, the monetary authority would not expect to keep the inflation rate between 1 and 3 percent each month because there are a number of temporary factors that move the inflation rate around each month (such as weather) over which the monetary authority has no control. But over a year or more, the expectation would be that the inflation rate would be between 1 and 3 percent. For example, in Hungary in 2008 the central bank set a medium-term inflation target of 3 percent.

In the discussion at the beginning of this section about the Fed’s response to the state of the economy, we assumed that the Fed was concerned about both inflation and output. When output is low, other things being equal, it was argued that the Fed is likely to lower the interest rate to stimulate the economy. If at the same time inflation is high (stagflation), the Fed is faced with a trade-off, and whether it raises or lowers the interest rate depends on how it weights output relative to inflation. In the case of inflation targeting, all the weight is on inflation. So inflation targeting is a special case of Fed behavior just discussed—namely, the case in which all of the Fed’s focus is on setting the interest rate to keep the inflation rate within some band over some horizon.

There has been much debate about whether inflation targeting is a good idea. The Fed under Alan Greenspan and previous chairs never engaged in inflation targeting, but the issue arose in the United States with the appointment of Ben Bernanke in 2006 as the new Fed chair. Bernanke had argued in the past in favor of inflation targeting, and people wondered whether the Fed would move in this direction under Bernanke. You can see in Figure 28.13 that the Fed began lowering the interest rate in 2007 in anticipation of a recession, which doesn’t look like inflation targeting. As we indicated in the opening to this chapter, however, inflation has not yet been a problem as the economy recovers from the 2008–2009 recession, and Bernanke has not yet been tested.

Looking Ahead

In Chapters 23 and 24, we discussed the concept of an equilibrium level of aggregate output and income, the idea of the multiplier, and the basics of fiscal policy. Those two chapters centered on the workings of the goods market alone.

In Chapters 25 and 26, we analyzed the money market by discussing the supply of money, the demand for money, the equilibrium interest rate, and the basics of monetary policy. In Chapter 27, we brought our analysis of the goods market together with our analysis of the money market and we derived the aggregate demand curve.

In this chapter, we introduced the aggregate supply curve. By using the aggregate supply and aggregate demand curves, we can determine the equilibrium price level in the economy and understand some causes of inflation.

We have still said little about employment, unemployment, and the functioning of the labor market in the macroeconomy. The next chapter will link everything we have done so far to this third major market arena—the labor market—and to the problem of unemployment.

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**THE AGGREGATE SUPPLY CURVE**

1. Aggregate supply is the total supply of goods and services in an economy. The aggregate supply (AS) curve shows the relationship between the aggregate quantity of output supplied by all the firms in an economy and the overall price level. The AS curve is *not* a market supply curve, and it is *not* the simple sum of all the individual supply curves in the economy.

2. The shape of the short-run AS curve is a source of much controversy in macroeconomics. Many economists believe that at very low levels of aggregate output, the AS curve is...
fairly flat and that at high levels of aggregate output, the AS curve is vertical or nearly vertical. Thus, the AS curve slopes upward and becomes vertical when the economy reaches its capacity, or maximum, output.

3. Anything that affects an individual firm’s marginal cost curve can shift the AS curve. The two main factors are wage rates and energy prices.

THE EQUILIBRIUM PRICE LEVEL p. 562

4. The equilibrium price level in the economy occurs at the point at which the AS and AD curves intersect. The intersection of the AS and AD curves corresponds to equilibrium in the goods and money markets and to a set of price/output decisions on the part of all the firms in the economy.

THE LONG-RUN AGGREGATE SUPPLY CURVE p. 563

5. If wages fully adjust to prices in the long run, then the long-run AS curve will be vertical.

6. The level of aggregate output that can be sustained in the long run without inflation is called potential output or potential GDP.

MONETARY AND FISCAL POLICY EFFECTS p. 565

7. If the economy is initially producing on the flat portion of the AS curve, an expansionary policy—which shifts the AD curve to the right—will result in a small increase in the equilibrium price level relative to the increase in equilibrium output. If the economy is initially producing on the steep portion of the AS curve, an expansionary policy results in a small increase in equilibrium output and a large increase in the equilibrium price level.

8. If the AS curve is vertical in the long run, neither monetary nor fiscal policy has any effect on aggregate output in the long run. For this reason, the exact length of the long run is one of the most pressing questions in macroeconomics.

CAUSES OF INFLATION p. 567

9. Demand-pull inflation is inflation initiated by an increase in aggregate demand. Cost-push, or supply-side, inflation is inflation initiated by an increase in costs like energy prices. An increase in costs may also lead to stagflation—the situation in which the economy is experiencing a contraction and inflation simultaneously.

10. Inflation can become “built into the system” as a result of expectations. If prices have been rising and people form their expectations on the basis of past pricing behavior, firms may continue raising prices even if demand is slowing or contracting.

11. When the price level increases, so too does the demand for money. If the economy is operating on the steep part of the AS curve and the Fed tries to keep the interest rate constant by increasing the supply of money, the result could be a hyperinflation—a period of very rapid increases in the price level.

THE BEHAVIOR OF THE FED p. 571

12. In practice, the Fed controls the interest rate rather than the money supply. The interest rate value that the Fed chooses depends on the state of the economy. The Fed wants high output and low inflation. The Fed is likely to decrease the interest rate during times of low output and low inflation, and it is likely to increase the interest rate during times of high output and high inflation.

13. The Fed generally had high interest rates in the 1970s and early 1980s as it fought inflation. Since 1983, inflation has been low by historical standards and the Fed focused in this period on trying to smooth fluctuations in output.

14. Inflation targeting is the case where the monetary authority weights only inflation. It chooses its interest rate values with the aim of keeping the inflation rate within some specified band over some specified horizon.

REVIEW TERMS AND CONCEPTS

aggregate supply, p. 560
aggregate supply (AS) curve, p. 560
cost-push, or supply-side, inflation, p. 568
cost shock, or supply shock, p. 562
demand-pull inflation, p. 567
equilibrium price level, p. 562
inflation targeting, p. 576
potential output, or potential GDP, p. 565
stagflation, p. 568

PROBLEMS

All problems are available on www.myeconlab.com

1. In Japan during the first half of 2000, the Bank of Japan kept interest rates at a near zero level in an attempt to stimulate demand. In addition, the government passed a substantial increase in government expenditure and cut taxes. Slowly, Japanese GDP began to grow with absolutely no sign of an increase in the price level. Illustrate the position of the Japanese economy with aggregate supply and demand curves. Where on the short-run AS curve was Japan in 2000?

2. In 2008, the price of oil rose sharply on world markets. What impact would you expect there to be on the aggregate price level and on real GDP? Illustrate your answer with aggregate demand and supply curves. What would you expect to be the effect on interest rates if the Fed held the money supply constant? Tell a complete story.

3. By using aggregate supply and demand curves to illustrate your points, discuss the impacts of the following events on the price level and on equilibrium GDP (Y) in the short run:
   a. A tax cut holding government purchases constant with the economy operating at near full capacity
   b. An increase in the money supply during a period of high unemployment and excess industrial capacity
c. An increase in the price of oil caused by a war in the Middle East, assuming that the Fed attempts to keep interest rates constant by accommodating inflation.

d. An increase in taxes and a cut in government spending supported by a cooperative Fed acting to keep output from falling.

4. During 1999 and 2000, a debate raged over whether the United States was at or above potential GDP. Some economists feared the economy was operating at a level of output above potential GDP and inflationary pressures were building. They urged the Fed to tighten monetary policy and increase interest rates to slow the economy. Others argued that a worldwide glut of cheap products was causing input prices to be lower, keeping prices from rising. By using aggregate supply and demand curves and other useful graphs, illustrate the following:

a. Those pushing the Fed to act were right, and prices start to rise more rapidly in 2000. The Fed acts belatedly to slow money growth (contract the money supply), driving up interest rates and pushing the economy back to potential GDP.

b. The worldwide glut gets worse, and the result is a falling price level (deflation) in the United States despite expanding aggregate demand.

5. [Related to the Economics in Practice on p. 564] The Economics in Practice describes the simple Keynesian aggregate supply curve as one in which there is a maximum level of output given the constraints of a fixed capital stock and a fixed supply of labor. The presumption is that increases in demand when firms are operating below capacity result in output increases and no input price or output price changes but that at levels of output above full capacity, firms have no choice but to raise prices of demand increases. In reality, however, the short-run aggregate supply curve isn’t flat and then vertical. Rather, it becomes steeper as we move from left to right on the diagram. Explain why. What circumstances might lead to an equilibrium at a very flat portion of the AS curve? At a very steep portion?

6. Using aggregate supply and aggregate demand curves to illustrate, describe the effects of the following events on the price level and on equilibrium GDP in the long run assuming that input prices fully adjust to output prices after some lag:

a. An increase occurs in the money supply above potential GDP

b. A decrease in government spending and in the money supply with GDP above potential GDP occurs

c. Starting with the economy at potential GDP, a war in the Middle East pushes up energy prices temporarily. The Fed expands the money supply to accommodate the inflation.

7. Two separate capacity constraints are discussed in this chapter: (1) the actual physical capacity of existing plants and equipment, shown as the vertical portion of the short-run AS curve, and (2) potential GDP, leading to a vertical long-run AS curve. Explain the difference between the two. Which is greater, full-capacity GDP or potential GDP? Why?

8. In country A, all wage contracts are indexed to inflation. That is, each month wages are adjusted to reflect increases in the cost of living as reflected in changes in the price level. In country B, there are no cost-of-living adjustments to wages, but the workforce is completely unionized. Unions negotiate 3-year contracts. In which country is an expansionary monetary policy likely to have a larger effect on aggregate output? Explain your answer using aggregate supply and aggregate demand curves.

9. During 2001, the U.S. economy slipped into a recession. For the next several years, the Fed and Congress used monetary and fiscal policies in an attempt to stimulate the economy. Obtain data on interest rates (such as the prime rate or the federal funds rate). Do you see evidence of the Fed’s action? When did the Fed begin its expansionary policy? Obtain data on total federal expenditures, tax receipts, and the deficit. (Try www.commerce.gov). When did fiscal policy become “expansionary”? Which policy seems to have suffered more from policy lags?

10. Describe the Fed’s tendency to “lean against the wind.” Do the Fed’s policies tend to stabilize or destabilize the economy?

11. [Related to the Economics in Practice on p. 573] In August 2010, the Fed’s discount rate was 0.75 percent and the federal funds rate was 0.25 percent, with a Fed target of 0–0.25 percent. The Economics in Practice states that all of the major investment banks employ economists to help them forecast what the Fed will do, and in mid-2010, many of these economists pushed back their expectations of when the Fed would raise interest rates, citing lower-than-anticipated inflation expectations, slow job growth, and an overall weak economy as reasons for the delay in rate increases. Go to www.frb.gov, www.bea.gov, and www.bls.gov to see what has happened to interest rates, the inflation rate, the unemployment rate, and GDP since August 2010. Were the economists’ forecasts of the Fed delaying interest rate increases until 2011 correct? Describe any apparent correlation between the changes in interest rates and changes in the inflation rate, the unemployment rate, and GDP since August 2010.

12. From the following graph, identify the initial equilibrium, the short-run equilibrium, and the long-run equilibrium based on the scenarios below. Explain your answers and identify what happens to the price level and aggregate output.

Scenario 1. The economy is initially in long-run equilibrium at point A, and a cost shock causes cost-push inflation. The government reacts by implementing an expansionary fiscal policy.

Scenario 2. The economy is initially in long-run equilibrium at point A, and an increase in government purchases causes demand-pull inflation. In the long run, wages respond to the inflation.

Scenario 3. The economy is initially in long-run equilibrium at point C, and the federal government implements an increase in corporate taxes and personal income taxes. In the long run, firms and workers adjust to the new price level and costs adjust accordingly.
Scenario 4. The economy is initially in equilibrium at point $C$, and energy prices decrease significantly. The government reacts by implementing a contractionary fiscal policy.

13. The economy of Mayberry is currently in equilibrium at point $A$ on the graph below. Prince Barney of Mayberry has decided that he wants the economy to grow and has ordered the Royal Central Bank of Mayberry to print more currency so banks can expand their loans to stimulate growth. Explain what will most likely happen to the economy of Mayberry as a result of Prince Barney’s actions and show the result on the graph.

14. Evaluate the following statement: In the short run, if an economy experiences inflation of 10 percent, the cause of the inflation is unimportant. Whatever the cause, the only important issue the government needs to be concerned with is the 10 percent increase in the price level.

15. [Related to the Economics in Practice on p. 570] A monthly survey conducted by Torcuato Di Tella University in Buenos Aires showed that in August 2010, people in Argentina expected inflation to increase 25 percent over the next 12 months, a similar response to the previous month’s survey. This shows a large discrepancy between inflation expectations and the Argentine Central Bank’s monthly index of consumer prices which showed prices rising at an annual rate of 11.2 percent, the highest level in 4 years. Use aggregate supply and demand curves to show the effect of these expectations of inflation on the Argentine economy, assuming firms increase prices in response to the expectations. What can the Argentine Central Bank do to try to lower the expectations to their projected inflation level of 11.2 percent? What impact would this have on the aggregate supply and demand curves?

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In previous chapters, we emphasized the three broadly defined markets in which households, firms, the government, and the rest of the world interact: (1) the goods market, discussed in Chapters 23 and 24; (2) the money market, discussed in Chapters 25 and 26; and (3) the labor market. In Chapter 22, we described some features of the U.S. labor market and explained how the unemployment rate is measured. Then in Chapter 28, we considered the labor market briefly in our discussion of the aggregate supply curve. Because labor is an input, what goes on in the labor market affects the shape of the aggregate supply (AS) curve. Sticky wages cause the AS curve to be upward sloping; if wages are completely flexible and rise every time prices rise by the same percentage, the AS curve will be vertical.

In this chapter, we look further at the labor market’s role in the macroeconomy. First, we consider the classical view, which holds that wages always adjust to clear the labor market, that is, to equate the supply of and demand for labor. We then consider why the labor market may not always clear and why unemployment may exist. Finally, we discuss the relationship between inflation and unemployment. As we go through the analysis, it is important to recall why unemployment is one of the three primary concerns of macroeconomics. Go back and reread “The Costs of Unemployment” in Chapter 22 (pp. 446–447). It is clear that unemployment imposes heavy costs on the unemployed and on society. In June 2010 there were 14.6 million people unemployed.

The Labor Market: Basic Concepts

On the first Friday of every month, the Labor Department releases the results of a household survey that provides an estimate of the number of people with a job, the employed \((E)\), as well as the number of people who are looking for work but cannot find a job, the unemployed \((U)\). The labor force \((LF)\) is the number of employed plus unemployed:

\[
LF = E + U
\]

The unemployment rate is the number of people unemployed as a percentage of the labor force:

\[
\text{unemployment rate} = \frac{U}{LF}
\]

To repeat, to be unemployed, a person must be out of a job and actively looking for work. When a person stops looking for work, he or she is considered out of the labor force and is no longer counted as unemployed.

It is important to realize that even if the economy is running at or near full capacity, the unemployment rate will never be zero. The economy is dynamic. Students graduate from schools...
unemployment rate The number of people unemployed as a percentage of the labor force.

frictional unemployment The portion of unemployment that is due to the normal working of the labor market; used to denote short-run job/skill matching problems.

structural unemployment The portion of unemployment that is due to changes in the structure of the economy that result in a significant loss of jobs in certain industries.

cyclical unemployment The increase in unemployment that occurs during recessions and depressions.

The Classical View of the Labor Market

The classical view of the labor market is illustrated in Figure 29.1. Classical economists assumed that the wage rate adjusts to equate the quantity demanded with the quantity supplied, thereby implying that unemployment does not exist. To see how this adjustment might take place, we can use the supply and demand curves in Figure 29.1. Curve D₀ is the labor demand curve. Each point on D₀ represents the amount of labor firms want to employ at each given wage rate. Each firm’s decision about how much labor to demand is part of its overall profit-maximizing decision. A firm makes a profit by selling output to households. It will hire workers if the value of its output is sufficient to justify the wage that is being paid. Thus, the amount of labor that a firm hires depends on the value of output that workers produce.

Figure 29.1 also shows a labor supply curve, labeled S. Each point on the labor supply curve represents the amount of labor households want to supply at each given wage rate. Each household’s decision concerning how much labor to supply is part of the overall consumer choice problem of a household. Each household member looks at the market wage rate, the prices of outputs, and the value of leisure time (including the value of staying at home and working in the yard or raising children) and chooses the amount of labor to supply (if any). A household member not in the labor force has decided that his or her time is more valuable in nonmarket activities.

In Figure 29.1 the labor market is initially in equilibrium at W₀ and L₀. Now consider what classical economists think would happen if there is a decrease in the demand for labor. The demand for labor curve shifts in from D₀ to D₁. The new demand curve intersects the labor supply curve at L₁ and W₁. There is a new equilibrium at a lower wage rate, in which fewer people are employed. Nevertheless, a decline in the demand for labor does not necessarily mean that unemployment will rise. If markets work as we described in Chapters 3 and 4, a decline in the demand for labor will initially create an excess supply of labor. As a result, the wage rate will fall until the quantity of labor supplied again equals the quantity of labor demanded, restoring equilibrium in the labor market. At the new lower wage rate, everyone who wants a job will have one.

If the quantity of labor demanded and the quantity of labor supplied are brought into equilibrium by rising and falling wage rates, there should be no persistent unemployment above the frictional and structural amount. Labor markets should behave just like simple output markets described in simple supply and demand curves. This was the view held by the classical economists who preceded Keynes, and it is still the view of a number of economists. Other economists believe that the labor market is different from other markets and that wage rates adjust only slowly to decreases in the demand for labor. If true, economies can suffer bouts of involuntary unemployment.
CHAPTER 29  The Labor Market In the Macroeconomy

Classical economists believe that the labor market always clears. If the demand for labor shifts from $D_0$ to $D_1$, the equilibrium wage will fall from $W_0$ to $W_1$. Anyone who wants a job at $W_1$ will have one.

The Classical Labor Market and the Aggregate Supply Curve

How does the classical view of the labor market relate to the theory of the vertical AS curve we covered in Chapter 28? The classical idea that wages adjust to clear the labor market is consistent with the view that wages respond quickly to price changes. In the absence of sticky wages, the AS curve will be vertical. In this case, monetary and fiscal policy will have no effect on real output. Indeed, in this view, there is no unemployment problem to be solved!

The Unemployment Rate and the Classical View

If, as the classical economists assumed, the labor market works well, how can we account for the fact that the unemployment rate at times seems high? There seem to be times when millions of people who want jobs at prevailing wage rates cannot find them. How can we reconcile this situation with the classical assumption about the labor market?

Some economists answer by arguing that the unemployment rate is not a good measure of whether the labor market is working well. We know the economy is dynamic and at any given time some industries are expanding and some are contracting. Consider, for example, a carpenter who is laid off because of a contraction in the construction industry. He had probably developed specific skills related to the construction industry—skills not necessarily useful for jobs in other industries. If he were earning $40,000 per year as a carpenter, he may be able to earn only $30,000 per year in another industry. He may eventually work his way back up to a salary of $40,000 in the new industry as he develops new skills, but this process will take time. Will this carpenter take a job at $30,000? There are at least two reasons he may not. First, he may believe that the slump in the construction industry is temporary and that he will soon get his job back. Second, he may mistakenly believe that he can earn more than $30,000 in another industry and will continue to look for a better job.

If our carpenter decides to continue looking for a job paying more than $30,000 per year, he will be considered unemployed because he is actively looking for work. This does not necessarily
mean that the labor market is not working properly. The carpenter has chosen not to work for a wage of $30,000 per year, but if his value to any firm outside the construction industry is no more than $30,000 per year, we would not expect him to find a job paying more than $30,000. In this case, a positive unemployment rate as measured by the government does not necessarily indicate that the labor market is working poorly.

If the degree to which industries are changing in the economy fluctuates over time, there will be more people like our carpenter at some times than at others. This variation will cause the measured unemployment rate to fluctuate. Some economists argue that the measured unemployment rate may sometimes seem high even though the labor market is working well. The quantity of labor supplied at the current wage is equal to the quantity demanded at the current wage. The fact that there are people willing to work at a wage higher than the current wage does not mean that the labor market is not working. Whenever there is an upward-sloping supply curve in a market (as is usually the case in the labor market), the quantity supplied at a price higher than the equilibrium price is always greater than the quantity supplied at the equilibrium price.

Economists who view unemployment this way do not see it as a major problem. Yet the haunting images of the bread lines in the 1930s are still with us, and many find it difficult to believe everything was optimal when over 14 million people were counted as unemployed in 2010. There are other views of unemployment, as we will now see.

Explaining the Existence of Unemployment

If unemployment is a major macroeconomic problem—and many economists believe that it is—then we need to explore some of the reasons that have been suggested for its existence. Among these are sticky wages, efficiency wages, imperfect information, and minimum wage laws.

Each of these explanations for unemployment focuses on a particular reason that wage rates do not completely adjust when the demand for labor falls. Because wage rates do not fall as far as needed, there will be more people who wish to work at the current wage rates than there are jobs for those people. This is what one means by unemployment.

Sticky Wages

One explanation for unemployment (above and beyond normal frictional and structural unemployment) is that wages are sticky on the downward side. We described this briefly in our building of the AS curve. This situation is illustrated in Figure 29.2, where the equilibrium wage gets stuck at $W_0$ (the original wage) and does not fall to $W^*$ when demand decreases from $D_0$ to $D_1$. The result is unemployment of the amount $L_0 - L_1$, where $L_0$ is the quantity of labor that households want to supply at wage rate $W_0$ and $L_1$ is the amount of labor that firms want to hire at wage rate $W_0$. $L_0 - L_1$ is the number of workers who would like to work at $W_0$ but cannot find jobs.

The sticky wage explanation of unemployment, however, begs the question. Why are wages sticky, if they are, and why do wages not fall to clear the labor market during periods of high unemployment? Many answers have been proposed, but as yet no one answer has been agreed on. This lack of consensus is one reason macroeconomics has been in a state of flux for so long. The existence of unemployment continues to be a puzzle. Although we will discuss the major theories that economists have proposed to explain why wages may not clear the labor market, we can offer no conclusions. The question is still open.

Social, or Implicit, Contracts

One explanation for downwardly sticky wages is that firms enter into social, or implicit, contracts with workers not to cut wages. It seems that extreme events—deep recession, deregulation, or threat of bankruptcy—are necessary for firms to cut wages. Wage cuts did occur in the Great Depression, in the airline industry following deregulation of the industry in the 1980s, and recently when some U.S. manufacturing firms found themselves in danger of bankruptcy from stiff foreign competition. These are exceptions to the general rule. For reasons that may be more sociological than economic, cutting wages seems close to being a taboo. In a recent study, Truman Bewley of Yale University surveyed hundreds of managers about why they did not reduce wage rates in downturns. The most common response was that wage cuts hurt worker morale and thus
negatively affect worker productivity. Breaking the taboo and cutting wages may be costly in this sense.

A related argument, the relative-wage explanation of unemployment, holds that workers are concerned about their wages relative to the wages of other workers in other firms and industries and may be unwilling to accept wage cuts unless they know that other workers are receiving similar cuts. Because it is difficult to reassure any one group of workers that all other workers are in the same situation, workers may resist any cut in their wages. There may be an implicit understanding between firms and workers that firms will not do anything that would make their workers worse off relative to workers in other firms.

Explicit Contracts  Many workers—in particular unionized workers—sign 1- to 3-year employment contracts with firms. These contracts stipulate the workers’ wages for each year of the contract. Wages set in this way do not fluctuate with economic conditions, either upward or downward. If the economy slows down and firms demand fewer workers, the wage will not fall. Instead, some workers will be laid off.

Although explicit contracts can explain why some wages are sticky, a deeper question must also be considered. Workers and firms surely know at the time a contract is signed that unforeseen events may cause the wages set by the contract to be too high or too low. Why do firms and workers bind themselves in this way? One explanation is that negotiating wages is costly. Negotiations between unions and firms can take a considerable amount of time—time that could be spent producing output—and it would be very costly to negotiate wages weekly or monthly. Contracts are a way of bearing these costs at no more than 1-, 2-, or 3-year intervals. There is a trade-off between the costs of locking workers and firms into contracts for long periods of time and the costs of wage negotiations. The length of contracts that minimizes negotiation costs seems to be (from what we observe in practice) between 1 and 3 years.

Some multiyear contracts adjust for unforeseen events by cost-of-living adjustments (COLAs) written into the contract. COLAs tie wages to changes in the cost of living: The greater the rate of inflation, the more wages are raised. COLAs thus protect workers from unexpected inflation, although many COLAs adjust wages by a smaller percentage than the percentage increase in prices.

Efficiency Wage Theory

Another explanation for unemployment centers on the efficiency wage theory, which holds that the productivity of workers increases with the wage rate. If this is true, firms may have an incentive to pay wages above the wage at which the quantity of labor supplied is equal to the quantity of labor demanded.

The key argument of the efficiency wage theory is that by offering workers a wage in excess of the market wage, the productivity of those workers is increased. Some economists have likened

**FIGURE 29.2**

Sticky Wages

If wages “stick” at $W_0$ instead of falling to the new equilibrium wage of $W^*$ following a shift of demand from $D_0$ to $D_1$, the result will be unemployment equal to $L_0 - L_1$. 

relative-wage explanation of unemployment  An explanation for sticky wages (and therefore unemployment): If workers are concerned about their wages relative to other workers in other firms and industries, they may be unwilling to accept a wage cut unless they know that all other workers are receiving similar cuts.

explicit contracts  Employment contracts that stipulate workers’ wages, usually for a period of 1 to 3 years.

cost-of-living adjustments (COLAs)  Contract provisions that tie wages to changes in the cost of living. The greater the inflation rate, the more wages are raised.

efficiency wage theory  An explanation for unemployment that holds that the productivity of workers increases with the wage rate. If this is so, firms may have an incentive to pay wages above the market-clearing rate.
ECONOMICS IN PRACTICE

Does Unemployment Insurance Increase Unemployment or Only Protect the Unemployed?

In the summer of 2010 Congress considered an expansion of the program of unemployment insurance. As the article below suggests, one of the debates around this program was whether the existence of such programs actually fueled unemployment. You can see that there is a considerable debate about the benefit of jobless benefits.

Long Recession Ignites Debate on Jobless Benefits

*The Wall Street Journal*

Management Recruiters of Sacramento, Calif., says it recently had a tough time filling six engineering positions at an Oregon manufacturer paying $60,000 a year—and suspects long-term jobless benefits were part of the hitch.

“We called several engineers that were unemployed,” says Karl Dinse, a managing partner at the recruiting firm. “They said, nah, you know, if it were paying $80,000 I’d think about it.” Some candidates suggested he call them back when their benefits were scheduled to run out, he says.

Rick Jewell has a different take on extended jobless benefits: He didn’t want to be on the dole, but had no alternative. He has been out of work since he lost his $12-an-hour job driving a forklift for a cosmetics company in Greenwood, Ind., in December 2008. He collected $315 a week in benefits until early June—when Congress declined to renew the law that gave workers in Indiana and some other states up to 99 weeks of assistance.

“I am tired of sitting at home. I am tired of not being the breadwinner,” says Mr. Jewell, who says he looks for work every day. He and his wife now rely on her $480 a week job as a distribution supervisor at the same cosmetics company.

In the long recession and the lackluster recovery, the government expanded unemployment payments more than at any time since the benefits were rolled out in the 1930s. And workers have gone jobless for longer than any time since official tallies began in 1967.

Politicians and economists are now in a fierce debate that could have big consequences for the jobless: Did more-generous unemployment benefits prompt jobless workers to be pickier in their searches? Or was the program a prudent response to the worst recession in generations?

Economists have argued for years about the extent to which government benefits prolong unemployment—and possibly augment the overall jobless rate. Most believe that expanding benefits does discourage some unemployed people from looking for work or taking available jobs. But they disagree on how acute that effect is, particularly at a time when jobs are scarce.

“Given the current economic situation I doubt that effect is very large,” says Harvard University economist Raj Chetty. “I think people will take whatever job they can get.”

In times when jobs are scarce, Mr. Levine argues that any disincentive to work is minimal. A recent Federal Reserve Bank of San Francisco study arrived at the same conclusion: Those who were eligible for unemployment benefits were out of work just 1.6 weeks longer than those who weren’t receiving benefits.


the payment of this higher wage as a gift-exchange: firms pay a wage in excess of the market wage and in return workers work harder or more productively than they otherwise would. Under these circumstances, there will be people who want to work at the wage paid by firms and cannot find employment. Indeed, for the efficiency wage theory to operate, it must be the case that the wage offered by firms is above the market wage. It is the gap between the two that motivates workers who do have jobs to outdo themselves.
Empirical studies of labor markets have identified several potential benefits that firms receive from paying workers more than the market-clearing wage. Among them are lower turnover, improved morale, and reduced “shirking” of work. Even though the efficiency wage theory predicts some unemployment, the behavior it is describing is unlikely to account for much of the observed large cyclical fluctuations in unemployment over time.

**Imperfect Information**

Thus far we have been assuming that firms know exactly what wage rates they need to set to clear the labor market. They may not choose to set their wages at this level, but at least they know what the market-clearing wage is. In practice, however, firms may not have enough information at their disposal to know what the market-clearing wage is. In this case, firms are said to have *imperfect information*. If firms have imperfect or incomplete information, they may simply set wages wrong—wages that do not clear the labor market.

If a firm sets its wages too high, more workers will want to work for that firm than the firm wants to employ, resulting in some potential workers being turned away. The result is, of course, unemployment. One objection to this explanation is that it accounts for the existence of unemployment only in the very short run. As soon as a firm sees that it has made a mistake, why would it not immediately correct its mistake and adjust its wages to the correct market-clearing level? Why would unemployment persist?

If the economy were simple, it should take no more than a few months for firms to correct their mistakes, but the economy is complex. Although firms may be aware of their past mistakes and may try to correct them, new events are happening all the time. Because constant change—including a constantly changing equilibrium wage level—is characteristic of the economy, firms may find it hard to adjust wages to the market-clearing level. The labor market is not like the stock market or the market for wheat, where prices are determined in organized exchanges every day. Instead, thousands of firms are setting wages and millions of workers are responding to these wages. It may take considerable time for the market-clearing wages to be determined after they have been disturbed from an equilibrium position.

**Minimum Wage Laws**

Minimum wage laws explain at least a small fraction of unemployment. These laws set a floor for wage rates—a minimum hourly rate for any kind of labor. In 2010, the federal minimum wage was $7.25 per hour. If the market-clearing wage for some groups of workers is below this amount, this group will be unemployed. In Figure 29.2, if the minimum wage is $W_0$ and the market-clearing wage is $W^*$, the number of unemployed will be $L_0 - L_1$.

Teenagers, who have relatively little job experience, are most likely to be hurt by minimum wage laws. If some teenagers can produce only $6.90 worth of output per hour, no firm would be willing to hire them at a wage of $7.25. To do so would incur a loss of $0.35 per hour. In an unregulated market, these teenagers would be able to find work at the market-clearing wage of $6.90 per hour. If the minimum wage laws prevent the wage from falling below $7.35, these workers will not be able to find jobs and they will be unemployed. Others who may be hurt include people with very low skills and some recent immigrants.

Some economists and political observers believe that one of the causes of unemployment is government programs, like unemployment insurance, that reduce the costs of being jobless. The *Economics in Practice* on p. 586 describes the debate on the role of jobless benefits in the most recent recession.

**An Open Question**

As we have seen, there are many explanations for why the labor market may not clear. The theories we have just set forth are not necessarily mutually exclusive, and there may be elements of truth in all of them. The aggregate labor market is very complicated, and there are no simple answers to why there is unemployment. Much current work in macroeconomics is concerned directly or indirectly with this question, and it is an exciting area of study. Which argument or arguments will win out in the end is an open question.
The Short-Run Relationship Between the Unemployment Rate and Inflation

At the Boston Fed in June 2008, Ben Bernanke, the Fed chair, gave a speech in which he referred to both the “upside risk to inflation,” and the “unwelcome rise in the unemployment rate.” Unemployment and inflation are the two central concerns of macroeconomics and of policy makers like Bernanke. But what is the relationship between the two? When Bernanke chooses to fight inflation, is he inevitably increasing unemployment and vice versa? We are now in a position to tackle this question.

We begin by looking at the relation between aggregate output (income) \( (Y) \) and the unemployment rate \( (U) \). For an economy to increase aggregate output, firms must hire more labor to produce that output. Thus, more output implies greater employment. An increase in employment means more people working (fewer people unemployed) and a lower unemployment rate. An increase in \( Y \) corresponds to a decrease in \( U \). Thus, \( U \) and \( Y \) are negatively related: when \( Y \) rises, the unemployment rate falls, and when \( Y \) falls, the unemployment rate rises.

What about the relationship between aggregate output and the overall price level? The AS curve, reproduced in Figure 29.3, shows the relationship between \( Y \) and the overall price level \( (P) \). The relationship is a positive one: When \( P \) increases, \( Y \) increases, and when \( P \) decreases, \( Y \) decreases.

As you will recall from the last chapter, the shape of the AS curve is determined by the behavior of the firms and how they react to an increase in demand. If aggregate demand shifts to the right and the economy is operating on the nearly flat part of the AS curve—far from capacity—output will increase, but the price level will not change much. However, if the economy is operating on the steep part of the AS curve—close to capacity—an increase in demand will drive up the price level, but output will be constrained by capacity and will not increase much.

Now let us put the two pieces together and think about what will happen following an event that leads to an increase in aggregate demand. First, firms experience an unanticipated decline in inventories. They respond by increasing output \( (Y) \) and hiring workers—the unemployment rate falls. If the economy is not close to capacity, there will be little increase in the price level. If, however, aggregate demand continues to grow, the ability of the economy to increase output will eventually reach its limit. As aggregate demand shifts farther and farther to the right along the AS curve, the price level increases more and more and output begins to reach its limit. At the point at which the AS curve becomes vertical, output cannot rise any farther. If output cannot grow, the unemployment rate cannot be pushed any lower. There is a negative relationship between the unemployment rate and the price level. As the unemployment rate declines in response to the economy’s moving closer and closer to capacity output, the overall price level rises more and more, as shown in Figure 29.4.

The AS curve in Figure 29.3 shows the relationship between the price level and aggregate output and thus implicitly between the price level and the unemployment rate, which is depicted in Figure 29.4. In policy formulation and discussions, however, economists have focused less on the relationship between the price level and the unemployment rate than on the relationship between

**FIGURE 29.3**

The Aggregate Supply Curve

The AS curve shows a positive relationship between the price level \( (P) \) and aggregate output (income) \( (Y) \).
the inflation rate—the percentage change in the price level—and the unemployment rate. Note that the price level and the percentage change in the price level are not the same. The curve describing the relationship between the inflation rate and the unemployment rate, which is shown in Figure 29.5, is called the Phillips Curve, after British economist A. W. Phillips, who first examined it using data for the United Kingdom. Fortunately, the analysis behind the AS curve (and thus the analysis behind the curve in Figure 29.4) will enable us to see both why the Phillips Curve initially looked so appealing as an explanation of the relationship between inflation and the unemployment rate and how more recent history has changed our views of the interpretation of the Phillips Curve.

The Phillips Curve: A Historical Perspective

In the 1950s and 1960s, there was a remarkably smooth relationship between the unemployment rate and the rate of inflation, as Figure 29.6 shows for the 1960s. As you can see, the data points fit fairly closely around a downward-sloping curve; in general, the higher the unemployment rate is, the lower the rate of inflation. The Phillips Curve in Figure 29.6 shows a trade-off between inflation and unemployment. The curve says that to lower the inflation rate, we must accept a higher unemployment rate, and to lower the unemployment rate, we must accept a higher rate of inflation.

Textbooks written in the 1960s and early 1970s relied on the Phillips Curve as the main explanation of inflation. Things seemed simple—inflation appeared to respond in a fairly predictable way to changes in the unemployment rate. Policy discussions in the 1960s often revolved around the Phillips Curve. The role of the policy maker, it was thought, was to choose a point on the curve. Conservatives usually argued for choosing a point with a low rate of inflation and were willing to accept a higher unemployment rate in exchange for this. Liberals usually argued for accepting more inflation to keep unemployment at a low level.
Life did not turn out to be quite so simple. The Phillips Curve broke down in the 1970s and 1980s. This change can be seen in Figure 29.7, which graphs the unemployment rate and inflation rate for the period from 1970 to 2009. The points in Figure 29.7 show no particular relationship between inflation and the unemployment rate.

Aggregate Supply and Aggregate Demand Analysis and the Phillips Curve

How can we explain the stability of the Phillips Curve in the 1950s and 1960s and the lack of stability after that? To answer, we need to return to AS/AD analysis.

If the AD curve shifts from year to year but the AS curve does not, the values of $P$ and $Y$ each year will lie along the AS curve [Figure 29.8(a)]. The plot of the relationship between $P$ and $Y$ will be upward sloping. Correspondingly, the plot of the relationship between the unemployment rate (which decreases with increased output) and the rate of inflation will be a curve that slopes
downward. In other words, we would expect to see a negative relationship between the unemployment rate and the inflation rate.

However, the relationship between the unemployment rate and the inflation rate will look different if the \( AS \) curve shifts from year to year but the \( AD \) curve does not. A leftward shift of the \( AS \) curve will cause an increase in the price level \( (P) \) and a decrease in aggregate output \( (Y) \) [Figure 29.8(b)]. When the \( AS \) curve shifts to the left, the economy experiences both inflation and an increase in the unemployment rate (because decreased output means increased unemployment). In other words, if the \( AS \) curve is shifting from year to year, we would expect to see a positive relationship between the unemployment rate and the inflation rate.

If both the \( AS \) and the \( AD \) curves are shifting simultaneously, however, there is no systematic relationship between \( P \) and \( Y \) [Figure 29.8(c)] and thus no systematic relationship between the unemployment rate and the inflation rate. One explanation for the change in the Phillips Curve between the 1960s and later periods is that both the \( AS \) and the \( AD \) curves appear to be shifting in the later periods—both shifts from the supply side and shifts from the demand side. This can be seen by examining a key cost variable: the price of imports.

**The Role of Import Prices** We discussed in the previous chapter that some of the main factors that causes the \( AS \) curve to shift are energy prices, particularly the price of oil. Since the United States imports much of its oil, the price index of U.S. imports is highly correlated with the (world) price of oil. We can thus consider that a change in the U.S. import price index, which we will call “the price of imports,” shifts the \( AS \) curve. The price of imports is plotted in Figure 29.9 for the 1960 I–2010 I period. As you can see, the price of imports changed very little between 1960 and 1970. There were no large shifts in the \( AS \) curve in the 1960s due to changes in the price of imports. There were also no other large changes in input prices in the 1960s, so overall the \( AS \) curve shifted very little during the decade. The main variation in the 1960s was in aggregate demand, so the shifting \( AD \) curve traced out points along the \( AS \) curve.

Figure 29.9 also shows that the price of imports increased considerably in the 1970s. This rise led to large shifts in the \( AS \) curve during the decade, but the \( AD \) curve was also shifting throughout the 1970s. With both curves shifting, the data points for \( P \) and \( Y \) were scattered all over the graph and the observed relationship between \( P \) and \( Y \) was not at all systematic.

This story about import prices and the \( AS \) and \( AD \) curves in the 1960s and 1970s carries over to the Phillips Curve. The Phillips Curve was stable in the 1960s because the primary source of variation in the economy was demand, not costs. In the 1970s, both demand and costs were varying so no obvious relationship between the unemployment rate and the inflation rate was

apparent. To some extent, what is remarkable about the Phillips Curve is not that it was not smooth after the 1960s, but that it ever was smooth.

**Expectations and the Phillips Curve**

Another reason the Phillips Curve is not stable concerns expectations. We saw in Chapter 28 that if a firm expects other firms to raise their prices, the firm may raise the price of its own product. If all firms are behaving this way, prices will rise because they are expected to rise. In this sense, expectations are self-fulfilling. Similarly, if inflation is expected to be high in the future, negotiated wages are likely to be higher than if inflation is expected to be low. Wage inflation is thus affected by expectations of future price inflation. Because wages are input costs, prices rise as firms respond to the higher wage costs. Price expectations that affect wage contracts eventually affect prices themselves.

If the rate of inflation depends on expectations, the Phillips Curve will shift as expectations change. For example, if inflationary expectations increase, the result will be an increase in the rate of inflation even though the unemployment rate may not have changed. In this case, the Phillips Curve will shift to the right. If inflationary expectations decrease, the Phillips Curve will shift to the left—there will be less inflation at any given level of the unemployment rate.

It so happened that inflationary expectations were quite stable in the 1950s and 1960s. The inflation rate was moderate during most of this period, and people expected it to remain moderate. With inflationary expectations not changing very much, there were no major shifts of the Phillips Curve, a situation that helps explain its stability during the period.

Near the end of the 1960s, inflationary expectations began to increase, primarily in response to the actual increase in inflation that was occurring because of the tight economy caused by the Vietnam War. Inflationary expectations increased even further in the 1970s as a result of large oil price increases. These changing expectations led to shifts of the Phillips Curve and are another reason the curve was not stable during the 1970s.

**Inflation and Aggregate Demand**

It is important to realize that the fact that the Phillips Curve broke down during the 1970s does not mean that aggregate demand has no effect on inflation. It simply means that inflation is affected by more than just aggregate demand. If, say, inflation is also affected by cost variables like the price of imports, there will be no stable relationship between just inflation and aggregate demand unless the cost variables are not changing. Similarly, if the unemployment rate is taken to be a measure of aggregate demand, where inflation depends on both the unemployment rate and cost variables, there will be no stable Phillips Curve unless the cost variables are not changing. Therefore, the unemployment rate can have an important effect on inflation even though this will not be evident from a plot of inflation against the unemployment rate—that is, from the Phillips Curve.
The Long-Run Aggregate Supply Curve, Potential Output, and the Natural Rate of Unemployment

Thus far we have been discussing the relationship between inflation and unemployment, looking at the short-run AS and AD curves. We turn now to look at the long run, focusing on the connection between output and unemployment.

Recall from Chapter 28 that many economists believe that in the long run, the AS curve is vertical. We have illustrated this case in Figure 29.10. Assume that the initial equilibrium is at the intersection of $AD_0$ and the long-run aggregate supply curve. Now consider a shift of the aggregate demand curve from $AD_0$ to $AD_1$. If wages are sticky and lag prices, in the short-run, aggregate output will rise from $Y_0$ to $Y_1$. (This is a movement along the short-run AS curve $AS_0$.) In the longer run, wages catch up. For example, next year’s labor contracts may make up for the fact that wage increases did not keep up with the cost of living this year. If wages catch up in the longer run, the AS curve will shift from $AS_0$ to $AS_1$ and drive aggregate output back to $Y_0$. If wages ultimately rise by exactly the same percentage as output prices, firms will produce the same level of output as they did before the increase in aggregate demand.

In Chapter 28, we said that $Y_0$ is sometimes called potential output. Aggregate output can be pushed above $Y_0$ in the short run. When aggregate output exceeds $Y_0$, however, there is upward pressure on input prices and costs. The unemployment rate is already quite low, firms are beginning to encounter the limits of their plant capacities, and so on. At levels of aggregate output above $Y_0$, costs will rise, the AS curve will shift to the left, and the price level will rise. Thus, potential output is the level of aggregate output that can be sustained in the long run without inflation.

This story is directly related to the Phillips Curve. Those who believe that the AS curve is vertical in the long run at potential output also believe that the Phillips Curve is vertical in the long run at some natural rate of unemployment. Changes in aggregate demand—including increases in government spending—increase prices, but do not change employment. Recall from Chapter 22 that the natural rate of unemployment refers to unemployment that occurs as a normal part of the functioning of the economy. It is sometimes taken as the sum of frictional unemployment and structural unemployment. The logic behind the vertical Phillips Curve is that whenever the unemployment rate

![FIGURE 29.10 The Long-Run Phillips Curve: The Natural Rate of Unemployment]

If the AS curve is vertical in the long run, so is the Phillips Curve. In the long run, the Phillips Curve corresponds to the natural rate of unemployment—that is, the unemployment rate that is consistent with the notion of a fixed long-run output at potential output. $U^*$ is the natural rate of unemployment.
is pushed below the natural rate, wages begin to rise, thus pushing up costs. This leads to a lower level of output, which pushes the unemployment rate back up to the natural rate. At the natural rate, the economy can be considered to be at full employment.

The Nonaccelerating Inflation Rate of Unemployment (NAIRU)

In Figure 29.10, the long-run vertical Phillips Curve is a graph with the inflation rate on the vertical axis and the unemployment rate on the horizontal axis. The natural rate of unemployment is $U^*$. In the long run, with a long-run vertical Phillips Curve, the actual unemployment rate moves to $U^*$ because of the natural workings of the economy.

Another graph of interest is Figure 29.11, which plots the change in the inflation rate on the vertical axis and the unemployment rate on the horizontal axis. Many economists believe that the relationship between the change in the inflation rate and the unemployment rate is as depicted by the PP curve in the figure. The value of the unemployment rate where the PP curve crosses zero is called the nonaccelerating inflation rate of unemployment (NAIRU). If the actual unemployment rate is to the left of the NAIRU, the change in the inflation rate will be positive. As depicted in the figure, at $U_1$, the change in the inflation rate is 1. Conversely, if the actual unemployment rate is to the right of the NAIRU, the change in the inflation rate is negative: At $U_2$, the change is $-1$.

Consider what happens if the unemployment rate decreases from the NAIRU to $U_1$ and stays at $U_1$ for many periods. Assume also that the inflation rate at the NAIRU is 2 percent. Then in the first period the inflation rate will increase from 2 percent to 3 percent. The inflation rate does not, however, just stay at the higher 3 percent value. In the next period, the inflation rate will increase from 3 percent to 4 percent and so on. The price level will be accelerating—that is, the change in the inflation rate will be positive—when the actual unemployment rate is below the NAIRU. Conversely, the price level will be decelerating—that is, the change in the inflation rate will be negative—when the actual unemployment rate is above the NAIRU.

The $PP$ curve in Figure 29.11 is like the $AS$ curve in Figure 29.3—the same factors that shift the $AS$ curve, such as cost shocks, can also shift the $PP$ curve. Figure 28.8 on p. 569 summarizes the various factors that can cause the $AS$ curve to shift, and these are also relevant for the $PP$ curve. A favorable shift for the $PP$ curve is to the left because the $PP$ curve crosses zero at a lower

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The NAIRU is actually misnamed. It is the price level that is accelerating or decelerating, not the inflation rate, when the actual unemployment rate differs from the NAIRU. The inflation rate is not accelerating or decelerating, but simply changing by the same amount each period. The namers of the NAIRU forgot their physics.
unemployment rate, indicating that the NAIRU is lower. Some have argued that one possible recent source of favorable shifts is increased foreign competition, which may have kept wage costs and other input costs down.

Before about 1995, proponents of the NAIRU theory argued that the value of the NAIRU in the United States was around 6 percent. By the end of 1995, the unemployment rate declined to 5.6 percent, and by 2000, the unemployment rate was down to 3.8 percent. If the NAIRU had been 6 percent, one should have seen a continuing increase in the inflation rate beginning about 1995. In fact, the 1995 to 2000 period saw slightly declining inflation. Not only did inflation not continually increase, it did not even increase once to a new, higher value and then stay there. As the unemployment rate declined during this period, proponents of the NAIRU lowered their estimates of it, more or less in line with the actual fall in the unemployment rate. This recalibration can be justified by arguing that there have been continuing favorable shifts of the \( PP \) curve, such as possible increased foreign competition. Critics, however, have argued that this procedure is close to making the NAIRU theory vacuous. Can the theory really be tested if the estimate of the NAIRU is changed whenever it is not consistent with the data? How trustworthy is the appeal to favorable shifts?

Macroeconomists are currently debating whether equations estimated under the NAIRU theory are good approximations. More time is needed before any definitive answers can be given.

Looking Ahead

This chapter concludes our basic analysis of how the macroeconomy works. In the preceding seven chapters, we have examined how households and firms behave in the three market arenas—the goods market, the money market, and the labor market. We have seen how aggregate output (income), the interest rate, and the price level are determined in the economy, and we have examined the relationship between two of the most important macroeconomic variables, the inflation rate and the unemployment rate. In Chapter 30, we use everything we have learned up to this point to examine a number of important policy issues.

SUMMARY

THE LABOR MARKET: BASIC CONCEPTS p. 581
1. Because the economy is dynamic, frictional and structural unemployment are inevitable and in some ways desirable. Times of cyclical unemployment are of concern to macroeconomic policy makers.
2. In general, employment tends to fall when aggregate output falls and rise when aggregate output rises.

THE CLASSICAL VIEW OF THE LABOR MARKET p. 582
3. Classical economists believe that the interaction of supply and demand in the labor market brings about equilibrium and that unemployment (beyond the frictional and structural amounts) does not exist.
4. The classical view of the labor market is consistent with the theory of a vertical aggregate supply curve.

EXPLAINING THE EXISTENCE OF UNEMPLOYMENT p. 584
5. Some economists argue that the unemployment rate is not an accurate indicator of whether the labor market is working properly. Unemployed people who are considered part of the labor force may be offered jobs but may be unwilling to take those jobs at the offered salaries. Some of the unemployed may have chosen not to work, but this result does not mean that the labor market has malfunctioned.
6. Those who do not subscribe to the classical view of the labor market suggest several reasons why unemployment exists. Downwardly sticky wages may be brought about by social (implicit) or explicit contracts not to cut wages. If the equilibrium wage rate falls but wages are prevented from falling also, the result will be unemployment.
7. Efficiency wage theory holds that the productivity of workers increases with the wage rate. If this is true, firms may have an incentive to pay wages above the wage at which the quantity of labor supplied is equal to the quantity of labor demanded. At all wages above the equilibrium, there will be an excess supply of labor and therefore unemployment.
8. If firms are operating with incomplete or imperfect information, they may not know what the market-clearing wage is. As a result, they may set their wages incorrectly and bring about unemployment. Because the economy is so complex, it may take considerable time for firms to correct these mistakes.
9. Minimum wage laws, which set a floor for wage rates, are one factor contributing to unemployment of teenagers and very low-skilled workers. If the market-clearing wage for some groups of workers is below the minimum wage, some members of this group will be unemployed.
THE SHORT-RUN RELATIONSHIP BETWEEN THE UNEMPLOYMENT RATE AND INFLATION p. 588

10. There is a negative relationship between the unemployment rate ($U$) and aggregate output (income) ($Y$): When $Y$ rises, $U$ falls. When $Y$ falls, $U$ rises.

11. The relationship between the unemployment rate and the price level is negative: As the unemployment rate declines and the economy moves closer to capacity, the price level rises more and more.

12. The Phillips Curve represents the relationship between the inflation rate and the unemployment rate. During the 1950s and 1960s, this relationship was stable and there seemed to be a predictable trade-off between inflation and unemployment. As a result of import price increases (which led to shifts in aggregate supply), the relationship between the inflation rate and the unemployment rate was erratic in the 1970s. Inflation depends on more than just the unemployment rate.

THE LONG-RUN AGGREGATE SUPPLY CURVE, POTENTIAL OUTPUT, AND THE NATURAL RATE OF UNEMPLOYMENT p. 593

13. Those who believe that the AS curve is vertical in the long run also believe that the Phillips Curve is vertical in the long run at the natural rate of unemployment. The natural rate is generally the sum of the frictional and structural rates. If the Phillips Curve is vertical in the long run, then there is a limit to how low government policy can push the unemployment rate without setting off inflation.

14. The NAIRU theory says that the price level will accelerate when the unemployment rate is below the NAIRU and decelerate when the unemployment rate is above the NAIRU.

**REVIEW TERMS AND CONCEPTS**

- cost-of-living adjustments (COLAs), p. 585
- cyclical unemployment, p. 582
- efficiency wage theory, p. 585
- explicit contracts, p. 585
- frictional unemployment, p. 582
- inflation rate, p. 589
- labor demand curve, p. 582
- labor supply curve, p. 582
- minimum wage laws, p. 587
- NAIRU, p. 594
- natural rate of unemployment, p. 593
- Phillips Curve, p. 589
- relative-wage explanation of unemployment, p. 585
- social, or implicit, contracts, p. 584
- sticky wages, p. 584
- structural unemployment, p. 582
- unemployment rate, p. 582

**PROBLEMS**

All problems are available on www.myeconlab.com

1. In April 2000, the U.S. unemployment rate dropped below 4 percent for the first time in 30 years. At the same time, inflation remained at a very low level by historical standards. Can you offer an explanation for what seems to be an improved trade-off between inflation and unemployment? What factors might improve the trade-off? What factors might make it worse?

2. [Related to the Economics in Practice on p. 586] Economists and politicians have long debated the extent to which unemployment benefits affect the duration of unemployment. The table below presents unemployment and unemployment benefit data for five high-income countries. The unemployment rate and the duration of unemployment benefits for each of the countries are shown for 2007, prior to the recession of 2008–2009, and for July 2010. As the data shows, three of these countries extended the duration of unemployment benefits as a result of the recession. The data for both 2007 and 2010 show a positive relationship between the duration of unemployment benefits and the unemployment rate. Discuss whether you believe the length of time in which a person can receive unemployment benefits directly affects the unemployment rate, and whether your answer applies to both 2007 and 2010. Look up the current unemployment rates in each of the five countries. Discuss whether a positive relationship still exists between the duration of unemployment benefits and the unemployment rate, and whether you believe the extension of unemployment benefits in three of those countries played a role in their current unemployment rates.

3. Obtain monthly data on the unemployment rate and the inflation rate for the last 2 years. (This data can be found at www.bls.gov or in a recent issue of the Survey of Current Business or in the Monthly Labor Review or Employment and Earnings, all published by the government and available in many college libraries.)

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>2007 UNEMPLOYMENT RATE</th>
<th>AVERAGE UNEMPLOYMENT BENEFITS DURATION, 2007</th>
<th>JULY 2010 UNEMPLOYMENT RATE</th>
<th>AVERAGE UNEMPLOYMENT BENEFITS DURATION, 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>6.4 %</td>
<td>50 weeks</td>
<td>8.0 %</td>
<td>50 weeks</td>
</tr>
<tr>
<td>France</td>
<td>8.7 %</td>
<td>52 weeks</td>
<td>10.0 %</td>
<td>104 weeks</td>
</tr>
<tr>
<td>Great Britain</td>
<td>5.3 %</td>
<td>26 weeks</td>
<td>7.8 %</td>
<td>26 weeks</td>
</tr>
<tr>
<td>Japan</td>
<td>3.9 %</td>
<td>13 weeks</td>
<td>5.3 %</td>
<td>21 weeks</td>
</tr>
<tr>
<td>United States</td>
<td>4.6 %</td>
<td>26 weeks</td>
<td>9.5 %</td>
<td>99 weeks</td>
</tr>
</tbody>
</table>
4. In 2010, the country of Ruba was suffering from a period of high unemployment. The new president, Clang, appointed Laurel Tiedye as his chief economist. Ms. Tiedye and her staff estimated these supply and demand curves for labor from data obtained from the secretary of labor, Robert Small:

\[ Q_D = 100 - 5W \]
\[ Q_S = 10W - 20 \]

where \( Q \) is the quantity of labor supplied/demanded in millions of workers and \( W \) is the wage rate in slugs, the currency of Ruba.

a. Currently, the law in Ruba says that no worker shall be paid less than 9 slugs per hour. Estimate the quantity of labor supplied, the number of unemployed, and the unemployment rate.

b. President Clang, over the objection of Secretary Small, has recommended to the congress that the law be changed to allow the wage rate to be determined in the market. If such a law was passed and the market adjusted quickly, what would happen to total employment, the size of the labor force, and the unemployment rate? Show the results graphically.

c. Will the Rubanese labor market adjust quickly to such a change in the law? Why or why not?

5. The following policies have at times been advocated for coping with unemployment. Briefly explain how each might work and explain which type or types of unemployment (frictional, structural, or cyclical) each policy is designed to alter.

a. A computer list of job openings and a service that matches employees with job vacancies (sometimes called an “economic dating service”)

b. Lower minimum wage for teenagers

c. Retraining programs for workers who need to learn new skills to find employment

d. Public employment for people without jobs

e. Improved information about available jobs and current wage rates

f. The president’s going on nationwide TV and attempting to convince firms and workers that the inflation rate next year will be low

6. Your boss offers you a wage increase of 10 percent. Is it possible that you are worse off with the wage increase than you were before? Explain your answer.

7. How will the following affect labor force participation rates, labor supply, and unemployment?

a. Because the retired elderly are a larger and larger fraction of the U.S. population, Congress and the president decide to raise the Social Security tax on individuals to continue paying benefits to the elderly.

b. A national child care program is enacted, requiring employers to provide free child care services.

c. The U.S. government reduces restrictions on immigration into the United States.

d. The welfare system is eliminated.

e. The government subsidizes the purchase of new capital by firms (an investment tax credit).

8. Draw a graph to illustrate the following:

a. A Phillips Curve based on the assumption of a vertical long-run aggregate supply curve

b. The effect of a change in inflationary expectations on a recently stable Phillips Curve

c. Unemployment caused by a recently enacted minimum wage law

9. Obtain data on “average hourly earnings of production workers” and the unemployment rate for your state or area over a recent 2-year period. Has unemployment increased or decreased? What has happened to wages? Does the pattern of unemployment help explain the movement of wages? Provide an explanation.

10. Suppose the inflation–unemployment relationship depicted by the Phillips Curve was stable. Do you think the U.S. trade-off and the Japanese trade-off would be identical? If not, what kinds of factors might make the trade-offs dissimilar?

11. The unemployment rate stood at 9.6 percent late in 2010. Despite the fact that the economy had been growing out of the recession for over a year (real GDP was up 3 percent by Q2 2010), there was only modest job growth during 2010. While a fiscal stimulus package provided some help, labor was “stuck in the mud.” Which of the following factors contributed to the problem and which ones were important?

a. Employment and unemployment are always lagging indicators since it is difficult to hire and fire in a downturn.

b. Productivity has grown considerably this decade; people are working hard and being paid less—in short, firms are “mean and lean.”

c. Construction employment, which is a traditional engine of growth in recoveries, has gone nowhere largely because of the fact that we dramatically overbuilt.

d. We have minimum wage laws in the United States.

e. Wages are sticky on the downward side, preventing the labor market from clearing.

f. The Census Bureau hired and then fired thousands of workers, throwing all the numbers off.

Choose two of these statements and write a short essay. Use data to support your claims.

12. How might social, or implicit, contracts result in sticky wages? Use a labor market graph to show the effect of social contracts on wages and on unemployment if the economy enters a recession.
We have seen that fiscal policy can affect the economy through tax and spending changes and that monetary policy can affect the economy through interest rate changes. Given that this has been known for many decades, you might ask why fluctuations in the economy are still so large? From Figure 20.5 on p. 418, you can see that there have been large fluctuations in the unemployment rate since 1990. Why can’t policy makers do better? This chapter covers a number of topics, but they are all concerned at least indirectly with trying to help answer this question. We will be considering the various constraints that policy makers face in trying to stabilize the economy.

The structure of the chapter is as follows. In the next section we will consider the stock market and the housing market. We will see that both of these markets have important effects on the economy through a household wealth effect. When, say, stock prices or housing prices rise, household wealth rises, and households respond to this by consuming more. Stock prices and housing prices are asset prices, and changes in these prices are, for the most part, unpredictable. Neither policy makers nor anyone else in the economy has the ability to predict how the stock and housing markets will behave in the future. This is then the first problem that policy makers face. If stock and housing prices have important effects on the economy and if changes in these prices are unpredictable, there is an important source of variation that policy makers can do nothing about. At best, policy makers can try to react quickly to these changes once they occur. We also discuss in this section what is meant by “financial crises” and what policy makers can and cannot do about them.

A second problem with trying to stabilize the economy is getting the timing right. This is the subject matter of the second section. We will see that there is a danger of overreacting to changes in the economy—making the fluctuations in the economy even worse than they otherwise would be.

The third section considers government deficit issues. We discussed at the end of Chapter 28 that it is important to distinguish between cyclical deficits and structural deficits. One expects that the government will run a deficit in a recession since tax revenue is down because of the sluggish economy and spending may be up as the government tries to stimulate the economy. If at full employment the government would still be running a deficit, this part of the deficit is the structural deficit.

In 2010 many countries, including the United States, faced serious structural deficit problems. We discuss various problems that may arise if a government runs large deficits year after year. We will see, returning to the subject matter of the first section, that one possible reaction is a financial crisis. The U.S. government also ran large structural deficits in the 1980s, and we conclude with a discussion of this period. There was an attempt in the late 1980s to legislate a requirement that the budget be balanced, and we examine how stabilization policy is affected under such a requirement.
The Stock Market, the Housing Market, and Financial Crises

Introductory macroeconomic textbooks written before 1990 could largely ignore the stock and housing markets. The effects of these markets on the macroeconomy were small enough to be put aside in introductory discussions. This changed in the 1990s for the stock market and after 2000 for the housing market. The stock market contributed to the boom in the last half of the 1990s and to the recession that followed. The housing market contributed to the expansion in 2002-2007 and to the recession that followed. For this reason, even introductory macroeconomics courses must spend some time looking at these two markets. We first turn to some background material on the stock market.

Stocks and Bonds

It will be useful to begin by briefly discussing the three main ways in which firms borrow or raise money to finance their investments. How do firms use financial markets in practice?

When a firm wants to make a large purchase to build a new factory or buy machines, it often cannot pay for the purchase out of its own funds. In this case, it must “finance” the investment. One way to do this is to borrow from a bank. The bank loans the money to the firm, the firm uses the money to buy the factory or machine, and the firm pays back the loan (with interest) to the bank over time.

Another possible way for a firm to borrow money is for the firm to issue a bond. If you buy a bond from a firm, you are making a loan to the firm. Bonds were discussed at the beginning of Chapter 26.

A third way for a firm to finance an investment is for it to issue additional shares of stock. When a firm issues new shares of stock, it does not add to its debt. Instead, it brings in additional owners of the firm, owners who agree to supply it with funds. Such owners are treated differently than bondholders, who are owed the amount they have loaned.

A share of common stock is a certificate that represents the ownership of a share of a business, almost always a corporation. For example, Lincoln Electric is a Cleveland-based company that makes welding and cutting equipment. The company has 41 million shares of common stock that are owned by tens of thousands of shareholders, some of whom are simply private individuals, some of whom are institutions such as Carleton College, and some of whom may be employees of the firm. Shareholders are entitled to a share of the company’s profit. When profits are paid directly to shareholders, the payment is called a dividend. In a recent year, Lincoln Electric made a profit of $54 million, which was $1.31 per share, of which $0.43 was paid out to shareholders as dividends and the rest was retained for investment.

Stockholders who own stocks that increase in value earn what are called capital gains. Realized capital gains (or losses) are increases (or decreases) in the value of assets, including stocks, that households receive when they actually sell those assets. The government considers realized capital gains net of losses to be income, although their treatment under the tax code has been very complex and subject to change every few years. The total return that an owner of a share of stock receives is the sum of the dividends received and the capital gain or loss.

Determining the Price of a Stock

What determines the price of a stock? If a share of stock is selling for $25, why is someone willing to pay that much for it? As we have noted, when you buy a share of stock, you own part of the firm. If a firm is making profits, it may be paying dividends to its shareholders. If it is not paying dividends but is making profits, people may expect that it will pay dividends in the future. Dividends are important in thinking about stocks because dividends are the form in which shareholders receive income from the firm. So one thing that is likely to affect the price of a stock is what people expect its future dividends will be. The larger the expected future dividends, the larger the current stock price, other things being equal.

Another important consideration in thinking about the price of a stock is the time the dividends are expected to be paid. A $2 per share dividend that is expected to be paid 4 years from now is worth less than a $2 per share dividend that is expected to be paid next year. In other words, the farther into the future the dividend is expected to be paid, the more it will be
“discounted.” The amount by which expected future dividends are discounted depends on the interest rate. The larger the interest rate, the more expected future dividends will be discounted. If the interest rate is 10 percent, I can invest $100 today and receive $110 a year from now. I am thus willing to pay $100 today to someone who will pay me $110 in a year. If instead, the interest rate were only 5 percent, I would be willing to pay $104.76 today to receive $110 a year from now because the alternative of $104.76 today at a 5 percent interest rate also yields $110.00 at the end of the year. I am thus willing to pay more for the promise of $110 a year from now when the interest rate is lower. In other words, I “discount” the $110 less when the interest rate is lower.

Another discount factor aside from the interest rate must be taken into account; it is the discount for risk. People prefer certain outcomes to uncertain ones for the same expected values. For example, I prefer a certain $50 over a bet in which there is a 50 percent chance I will get $100 and a 50 percent chance I will get nothing. The expected value of the bet is $50, but I prefer the certain $50 over the bet, where there is a 50 percent chance that I will end up with nothing. The same reasoning holds for future dividends. If, say, I expect dividends for both firms A and B to be $2 per share next year but firm B has a much wider range of possibilities (is riskier), I will prefer firm A. Put another way, I will “discount” firm B’s expected future dividends more than firm A’s because the outcome for firm B is more uncertain.

We can thus say that the price of a stock should equal the discounted value of its expected future dividends, where the discount factors depend on the interest rate and risk. If for some reason (say, a positive surprise news announcement from the firm) expected future dividends increase, this development should lead to an increase in the price of the stock. If the interest rate falls, this decrease should also lead to a stock price increase. Finally, if the perceived risk of a firm falls, this perception should increase the firm’s stock price.

Some stock analysts talk about the possibility of stock market “bubbles.” Given the preceding discussion, what might a bubble be? Assume that given your expectations about the future dividends of a firm and given the discount rate, you value the firm’s stock at $20 per share. Is there any case in which you would pay more than $20 for a share? You can, of course, buy the stock and sell it later; you don’t need to hold the stock forever. If the stock is currently selling for $25, which is above your value of $20, but you think that the stock will rise to $30 in the next few months, you might buy it now in anticipation of selling it later for a higher price. If others have similar views, the price of the stock may be driven up.

In this case, what counts is not the discounted value of expected future dividends, but rather your view of what others will pay for the stock in the future. If everyone expects that everyone else expects that the price will be driven up, the price may be driven up. One might call this outcome a bubble because the stock price depends on what people expect that other people expect and so on.

When a firm’s stock price has risen rapidly, it is difficult to know whether the reason is that people expect dividends or that people expect that people expect that the price will rise. In this case, what counts is not the discounted value of expected future dividends, but rather your view of what others will pay for the stock in the future. If everyone expects that everyone else expects that the price will be driven up, the price may be driven up. One might call this outcome a bubble because the stock price depends on what people expect that other people expect and so on.

The Stock Market Since 1948

If you follow the stock market at all, you know that much attention is paid to two stock price indices: the Dow Jones Industrial Average and the NASDAQ Composite. From a macroeconomic perspective, however, these two indices cover too small a sample of firms. One would like an index that includes firms whose total market value is close to the market value of all firms in the economy. For this purpose a much better measure is the S&P 500 stock price index, called the S&P 500. This index includes most of the companies in the economy by market value.

The S&P 500 index is plotted in Figure 30.1 for 1948 I–2010 I. What perhaps stands out most in this plot is the huge increase in the index between 1995 and 2000. Between December 31, 1994, and March 31, 2000, the S&P 500 index rose 226 percent, an annual rate of increase of 25 percent. This is by far the largest stock market boom in U.S. history, completely dominating the boom of the 1920s. Remember that we are talking about the S&P 500 index, which includes most of the firms in the U.S. economy by market value. We are not talking about just a few dot-com companies. The entire stock market went up 25 percent per year for 5 years! This boom added roughly $14 trillion to household wealth, about $2.5 trillion per year.

What caused this boom? You can see from Figure 28.13 on p. 575 that interest rates did not change much in the last half of the 1990s, so the boom cannot be explained by any large fall in interest rates. This suggests that the boom is likely the result of something other than changes in the economy. What caused the stock market boom of the late 1990s? The answer is that people thought that stock prices would continue to rise, even though the fundamentals of the economy did not justify such a prediction.
interest rates. Perhaps profits rose substantially during this period, and this growth led to a large increase in expected future dividends? We know from the preceding discussion that if expected future dividends increase, stock prices should increase. Figure 30.2 plots for 1948 I–2010 I the ratio of after-tax profits to GDP. It is clear from the figure that nothing unusual happened in the last half of the 1990s. The share of after-tax profits in GDP rose from the middle of 1995 to the middle of 1997, but then generally fell after that through 2000. Thus, there does not appear to be any surge of profits that would have led people to expect much higher future dividends.

It could be that the perceived riskiness of stocks fell in the last half of the 1990s. This change would have led to smaller discount rates for stocks and thus, other things being equal, to higher stock prices. Although this possibility cannot be completely ruled out, there is no strong independent evidence that perceived riskiness fell.

The stock market boom is thus a puzzle, and many people speculate that it was simply a bubble. For some reason, stock prices started rising rapidly in 1995 and people expected that other people expected that prices would continue to rise. This led stock prices to rise further, thus fulfilling the expectations, which led to expectations of further increases, and so on. Bubble believers note that once stock prices started falling in 2000, they fell a great deal. It is not the case that stock prices just leveled out in 2000; they fell rapidly. People of the bubble view argue that this is simply the bubble bursting.

The first problem then for the stability of the macroeconomy are the large and seemingly unpredictable swings in the stock market. The Economics in Practice on p. 603 describes the Fed’s interest in bubbles. As we will see, these swings induce behavior changes by households and firms that affect the real economy. Before we explore this link, we turn to a second volatile series: housing prices.
We discussed in the text that the huge increase in U.S. stock prices in the last half of the 1990s is a puzzle. So also is the huge increase in U.S. housing prices between 2002 and 2006. Recently, many other countries also have seen large increases in asset prices. An interesting question is whether these rapid run-ups in prices are bubbles, generated by irrational consumers and investors, or are instead the result of actions of rational investors that simply turned out with hindsight to be wrong. This question is of interest to both academics and policy makers. A key policy question is whether the Fed should ignore asset prices or try to use interest rates to control them. The following article discusses some research that is currently being done on bubbles and its implications for Fed behavior.

Bernanke’s Bubble Laboratory: Princeton Protégés of Fed Chief Study the Economics of Manias

The Wall Street Journal

PRINCETON, N.J.—First came that tech-stock bubble. Then there were bubbles in housing and credit. Chinese stocks took off like a rocket. Now, as prices soar on every material from oil to corn, some suggest there’s a bubble in commodities.

But how and why do bubbles form? Economists traditionally haven’t offered much insight. From World War II till the mid-1980s, there weren’t many U.S. investing manias for them to look at. The study of bubbles was left to economic historians sifting through musty records of 17th-century Dutch tulip-bulb prices and the like.

The dot-com boom began to change that. “You were seeing live, in action, the unfolding of lots of examples of valuations disconnecting from fundamentals,” says Princeton economist Harrison Hong. Now, the study of financial bubbles is hot.

Its hub is Princeton, 40 miles south of Wall Street, home to a band of young scholars hired by former professor Ben Bernanke, now the nation’s chief bubble watcher as Federal Reserve chairman. The group includes Mr. Hong, a Vietnam native raised in Silicon Valley; a Chinese wunderkind who started as a physicist [Wei Xiong]; and a German who’d been groomed to take over the family carpentry business [Markus Brunnermeier]. Among their conclusions:

Bubbles emerge at times when investors profoundly disagree about the significance of a big economic development, such as the birth of the Internet. Because it’s so much harder to bet on prices going down than up, the bullish investors dominate.

Once they get going, financial bubbles are marked by huge increases in trading, making them easier to identify.

Manias can persist even though many smart people suspect a bubble, because no one of them has the firepower to successfully attack it. Only when skeptical investors act simultaneously—a moment impossible to predict—does the bubble pop.

As a result of all that and more, the Princeton squad argues that the Fed can and should try to restrain bubbles, rather than following former Chairman Alan Greenspan’s approach: watchful waiting while prices rise and then cleaning up the mess after a bubble bursts.

If the tech-stock collapse didn’t make that clear, the damage done by the housing and credit bubbles should, argues José Scheinkman, 60 years old, a theorist Mr. Bernanke recruited in 1999 from the University of Chicago. “Advanced economies are very dependent on the health of the financial system. What this bubble did was destroy the capacity of the financial system to finance the U.S. economy,” Mr. Scheinkman says.

The Fed is giving the activist approach some thought. In a speech scheduled for delivery Thursday night, Fed Governor Frederic Mishkin suggested that while it was inappropriate to use the blunt instrument of interest-rate increases to prick bubbles, if too-easy credit appeared to be fueling a mania, policy makers might craft a regulatory response that could “help reduce the magnitude of the bubble.”

Yet the very concept of bubbles is at odds with the view of some that market prices reflect the collective knowledge of multitudes. There are economists who dispute the existence of bubbles—arguing, for instance, that what happened to prices in the dot-com boom was a rational response to the possibility that nascent Internet firms might turn into Microsofts. But these economists’ numbers are thinning.

Housing Prices Since 1952

Figure 30.3 plots the relative price of housing for 1952 I–2010 I. The plotted figure is the ratio of an index of housing prices to the GDP deflator. When this ratio is rising, it means that housing prices are rising faster than the overall price level, and vice versa when the ratio is falling.

The plot in Figure 30.3 is remarkable. Housing prices grew roughly in line with the overall price level until about 2000. The increase between 2000 and 2006 was then huge, followed by a huge fall between 2006 and 2009. Between 2000 I and 2006 I the value of housing wealth increased by about $13 trillion, roughly $500 billion per quarter. Between 2006 II and 2009 I the fall in the value of housing wealth was about $7 trillion, over $600 billion per quarter. Once again, it is hard to find a cogent reason for this based on the use value of housing.

Household Wealth Effects on the Economy

We see that both the stock market and the housing market have periods of large unpredictable ups and downs. How are these swings felt in the real economy? We mentioned in Chapter 23 that one of the factors that affects consumption expenditures is wealth. Other things being equal, the more wealth a family has, the more it spends. We discuss this in detail in the next chapter, but all we need to note now is that an increase in wealth increases consumer spending. Much of the fluctuation in household wealth is due to fluctuations in stock prices and housing prices. When housing and stock values rise, households feel richer and they spend more. As a rough rule of thumb, a $1.00 change in the value of wealth (either stocks or housing) leads to about a $0.03 to $0.04 change in consumer spending. With unpredictable wealth change, we end up with unpredictable consumption changes and thus unpredictable changes in GDP.

An increase in stock prices may also increase investment. If a firm is considering an investment project, one way in which it can finance the project is to issue additional shares of stock. The higher the price of the firm’s stock, the more money it can get per additional share. A firm is thus likely to undertake more investment projects the higher its stock price. The cost of an investment project in terms of shares of stock is smaller the higher the price of the stock. This is the way a stock market boom may increase investment and a stock market contraction may decrease investment. Stock price changes affect a firm’s cost of capital.

Financial Crises and the 2008 Bailout

It is clear that the stock market boom in the last half of the 1990s contributed to the strong economy in that period and that the contraction in the stock market after that contributed to the 2000–2001 recession. It is also clear that the boom in housing prices in the 2000–2005 period contributed to the expansion that followed the 2000–2001 recession and that the collapse of housing prices between
2006 and 2009 contributed to the 2008–2009 recession. This is just the household wealth effect at work combined in the case of stock prices with an effect on the investment spending of firms.

The recession of 2008–2009 was also characterized by some observers as a period of financial crisis. While there is no precise definition of a financial crisis, most financial writers identify financial crises as periods in which the financial institutions that facilitate the movement of capital across households and firms cease to work smoothly. In a financial crisis, macroeconomic problems caused by the wealth effect of a falling stock market or housing market are accentuated.

Many people consider the large fall in housing prices that began at the end of 2006 to have led to the financial crisis of 2008–2009. We have discussed in Chapter 25 some of the reasons for this fall. Lax government regulations led to excessive risk taking during the housing boom, with many people taking out mortgages that could only be sustained if housing prices kept rising. Once housing prices started to fall, it became clear that many households had taken on too much debt, and the value of many mortgage-backed securities dropped sharply. Many large financial institutions were involved in the mortgage market, and they began to experience financial trouble. With the exception of Lehman Brothers, which went bankrupt, most of the large financial institutions were bailed out by the federal government—a $700 billion bailout bill that was passed in October 2008. These institutions included Goldman Sachs, Citigroup, Morgan Stanley, J.P. Morgan Chase, and A.I.G. The government provided capital to these firms to ease their financial difficulties. The Federal Reserve also participated in the bailout, buying huge amounts of mortgage-backed securities. We saw in Chapter 25 that in 2010, the Fed held about $1.3 trillion in mortgage-backed securities, which it purchased in 2008 and 2009. Many other countries had similar issues, in part because many of the large financial institutions in other countries had purchased U.S. mortgage-backed securities.

What would have happened had the U.S. government not bailed out the large financial institutions? This is a matter of debate among economists and politicians. But some effects are clear. Absent intervention, the negative wealth effect would have been larger. Some of the financial institutions would have gone bankrupt, which would have wiped out their bondholders. Many of these bonds are held by the household sector, so household wealth would have fallen from the loss in value of the bonds. The fall in overall stock prices would also likely have been larger, thus contributing to the negative wealth effect. The government bailout thus reduced the fall in wealth that took place during this period. Some people also argue that lending to businesses would have been lower had there been no bailout. This would have forced businesses to cut investment, thereby contributing to the contraction in aggregate demand. It is not clear how important this effect is since, as seen in Chapter 25, much of the Fed’s purchase of mortgage-backed securities ended up as excess reserves in banks, not as increased loans.

It is important to distinguish between the stimulus measures the government took to fight the 2008–2009 recession, which were tax cuts and spending increases, and the bailout activity, which was direct help to financial institutions to keep them from failing. Putting aside the stimulus measures, was the bailout a good idea? On the positive side, it lessened the negative wealth effect and possibly led to more loans to businesses. Also, much of the lending to the financial institutions has or will be repaid; so the final total cost will be less than $700 billion. On the negative side, there were political and social costs. Most of the people who benefited from the bailout were wealthy—certainly wealthier than average. The wealth that didn’t fall because of the bailout was mostly wealth of high-income people—people holding the bonds of the financial institutions. Also, the jobs in the financial institutions that were saved were mostly jobs of high-income earners. People who will pay for the bailout in the long run are the U.S. taxpayers, who are on average less wealthy than those who benefited from the bailout. The bailout thus likely had, or at least was perceived by many to have had, bad income distribution consequences, which put a strain on the body politic. Even though much of the money will be repaid, not all of it will, and the perception lingers that the rich were bailed out. We come back to this in the third section of this chapter, but the bailout will probably make it harder to increase tax rates on middle-income people in the future.

Asset Markets and Policy Makers

It should be clear by now that stock prices and housing prices have played a large role in the economy since the 1990s. The problem for policy makers trying to stabilize the economy is that it is hard to predict changes in stock and housing prices. Who could have predicted ahead of time the boom in the stock market that began in 1995, or the boom in housing prices that began in 2000, or the collapse of housing prices that began in 2006? Changes in asset prices like these are essentially
ECONOMICS IN PRACTICE

Financial Reform Bill

In July 2010 in the aftermath of the financial crisis and subsequent bailout of much of the U.S. banking system, as a response to pressure for increased regulation of the banking system, Congress passed the Dodd-Frank Wall Street Reform and Consumer Protection Act. The article below describes some of the main provisions of this bill.

Time Lags Regarding Monetary and Fiscal Policy

We have so far seen that asset-price changes are difficult for policy makers to deal with because they can’t be predicted ahead of time. At best, policy makers deal with these changes only after they occur. Even once problems are recognized, however, responding to these problems takes time. Consider the two possible time paths for aggregate output (income) ($Y$) shown in Figure 30.4. In path $B$ (the light blue line), the fluctuations in GDP are smaller than those in path $A$ (the dark blue line). One aim of stabilization policy is to smooth out fluctuations in output to try to move the economy toward path $B$.
economy along a path like B instead of A. Stabilization policy is also concerned with the stability of prices. Here the goal is not to prevent the overall price level from rising at all, but instead to achieve an inflation rate that is as close as possible to a target rate of about 2 percent given the government’s other goals of high and stable levels of output and employment.

Stabilization goals are not easy to achieve. The existence of various kinds of **time lags**, or delays in the response of the economy to stabilization policies, can make the economy difficult to control. Economists generally recognize three kinds of time lags: recognition lags, implementation lags, and response lags.

**Stabilization**

Figure 30.5 shows timing problems a government may face when trying to stabilize the economy. Suppose the economy reaches a peak and begins to slide into recession at point A (at time $t_0$). Policy makers do not observe the decline in GDP until it has sunk to point B (at time $t_1$). By the time they have begun to stimulate the economy (point C, time $t_2$), the recession is well advanced and the economy has almost bottomed out. When the policies finally begin to take effect (point D, time $t_3$), the economy is already on its road to recovery. The policies push the economy to point $E'$—a much greater fluctuation than point E, which is where the economy would have been without the stabilization policy. Sometime after point D, policy makers may begin to realize that the economy is expanding too quickly. By the time they have implemented contractionary policies and the policies have made their effects felt, the economy is starting to weaken. The contractionary policies therefore end up pushing GDP to point $F'$ instead of point $F$.

Because of the various time lags, the expansionary policies that should have been instituted at time $t_0$ do not begin to have an effect until time $t_3$, when they are no longer needed. The light blue line in Figure 30.5 shows how the economy behaves as a result of the “stabilization” policies. The dark blue line shows the time path of GDP if the economy had been allowed to run its course and no stabilization policies had been attempted. In this case, stabilization policy makes income more variable than it would have been without the policies.
more erratic, not less—the policy results in a peak income of $E'$ as opposed to $E$ and a trough income of $F'$ instead of $F$.

Critics of stabilization policy argue that the situation in Figure 30.5 is typical of the interaction between the government and the rest of the economy. This claim is not necessarily true. We need to know more about the nature of the various kinds of lags before deciding whether stabilization policy is good or bad.

**Recognition Lags**

It takes time for policy makers to recognize a boom or a slump. Many important data—those from the national income and product accounts, for example—are available only quarterly. It usually takes several weeks to compile and prepare even the preliminary estimates for these figures. If the economy goes into a slump on January 1, the recession may not be detected until the data for the first quarter are available at the end of April.

Moreover, the early national income and product accounts data are only preliminary, based on an incomplete compilation of the various data sources. These estimates can, and often do, change as better data become available. This situation makes the interpretation of the initial estimates difficult, and recognition lags result.

**Implementation Lags**

The problems that lags pose for stabilization policy do not end once economists and policy makers recognize that the economy is in a boom or a slump. Even if everyone knows that the economy needs to be stimulated or reined in, it takes time to put the desired policy into effect, especially for actions that involve fiscal policy. Implementation lags result.

Each year Congress decides on the federal government’s budget for the coming year. The tax laws and spending programs embodied in this budget are hard to change once they are in place. If it becomes clear that the economy is entering a recession and is in need of a fiscal stimulus during the middle of the year, there is a limited amount that can be done. Until Congress authorizes more spending or a cut in taxes, changes in fiscal policy are not possible.¹

Monetary policy is less subject to the kinds of restrictions that slow down changes in fiscal policy. As we saw in Chapter 25, the Fed’s main tool for controlling the supply of money or the interest rate is open market operations—buying and selling government securities. Transactions in these securities take place in a highly developed market, and if the Fed chooses, it can buy or sell a large volume of securities in a very short period of time. The implementation lag for monetary policy is generally much shorter than for fiscal policy. When the Fed wants to increase the supply of money, it goes into the open market and purchases government securities. This action instantly increases the stock of money (bank reserves held at the Fed), and an expansion of the money supply begins.

**Response Lags**

Even after a macroeconomic problem has been recognized and the appropriate policies to correct it have been implemented, there are response lags—lags that occur because of the operation of the economy itself. Even after the government has formulated a policy and put it into place, the economy takes time to adjust to the new conditions. Although monetary policy can be adjusted and implemented more quickly than fiscal policy, it takes longer to make its effect felt on the economy because of response lags. What is most important is the total lag between the time a problem first occurs and the time the corrective policies are felt.

**Response Lags for Fiscal Policy** One way to think about the response lag in fiscal policy is through the government spending multiplier. This multiplier measures the change in GDP caused by a given change in government spending or net taxes. It takes time for the multiplier to

¹ Do not forget, however, about the existence of automatic stabilizers (Chapter 24). Many programs contain built-in countercyclical features that expand spending or cut tax collections automatically (without the need for congressional or executive action) during a recession.
reach its full value. The result is a lag between the time a fiscal policy action is initiated and the
time the full change in GDP is realized.

The reason for the response lag in fiscal policy—the delay in the multiplier process—is sim-
ple. During the first few months after an increase in government spending or a tax cut, there is
not enough time for the firms or individuals who benefit directly from the extra government
spending or the tax cut to increase their own spending. Neither individuals nor firms revise their
spending plans instantaneously. Until they can make those revisions, extra government spending
does not stimulate extra private spending.

Changes in government purchases are a component of aggregate expenditure. When $G$
risers,
aggregate expenditure increases directly; when $G$ falls, aggregate expenditure decreases directly.
When personal taxes are changed, however, an additional step intervenes, giving rise to another
lag. Suppose a tax cut has lowered personal income taxes across the board. Each household must
decide what portion of its tax cut to spend and what portion to save. This decision is the extra
step. Before the tax cut gets translated into extra spending, households must take the step of
increasing their spending, which usually takes some time.

With a business tax cut, there is a further complication. Firms must decide what to do
with their added after-tax profits. If they pay out their added profits to households as divi-
dends, the result is the same as with a personal tax cut. Households must decide whether to
spend or to save the extra funds. Firms may also retain their added profits and use them for
investment, but investment is a component of aggregate expenditure that requires planning
and time.

In practice, it takes about a year for a change in taxes or in government spending to have its
full effect on the economy. This response lag means that if we increase spending to counteract a
recession today, the full effects will not be felt for 12 months. By that time, the state of the econ-
omy might be very different.

Response Lags for Monetary Policy Monetary policy works by changing interest rates,
which then change planned investment. Interest rates can also affect consumption spending, as
we discuss further in Chapter 31. For now, it is enough to know that lower interest rates usually
stimulate consumption spending and that higher interest rates decrease consumption spending.

The response of consumption and investment to interest rate changes takes time. Even if
interest rates were to drop by 5 percent overnight, firms would not immediately increase
their investment purchases. Firms generally make their investment plans several years in
advance. If General Motors (GM) wants to respond to a decrease in interest rates by invest-
ing more, it will take time—perhaps up to a year—for the firm to come up with plans for a
new factory or assembly line. While drawing up such plans, GM may spend little on new
investments. The effect of the decrease in interest rates may not make itself felt for quite
some time.

The response lags for monetary policy are even longer than response lags for fiscal pol-
cy. When government spending changes, there is a direct change in the sales of firms, which
sell more as a result of the increased government purchases. When interest rates change,
however, the sales of firms do not change until households change their consumption spend-
ing and/or firms change their investment spending. It takes time for households and firms to
respond to interest rate changes. In this sense, interest rate changes are like tax-rate changes.
The resulting change in firms’ sales must wait for households and firms to change their pur-
chases of goods.

Summary
Stabilization is thus not easily achieved even if there are no surprise asset-price changes. It
takes time for policy makers to recognize the existence of a problem, more time for them to
implement a solution, and yet more time for firms and households to respond to the stabiliza-
tion policies taken. Monetary policy can be adjusted more quickly and easily than taxes or
government spending, making it a useful instrument in stabilizing the economy. However,
because the economy’s response to monetary changes is probably slower than its response
to changes in fiscal policy, tax and spending changes may also play a useful role in macro-
economic management.
Government Deficit Issues

If a government is trying to stimulate the economy through tax cuts or spending increases, this, other things being equal, will increase the government deficit. One thus expects deficits in recessions—cyclical deficits. These deficits are temporary and do not impose any long-run problems, especially if modest surpluses are run when there is full employment. If, however, at full employment the deficit—the structural deficit—is still large, this can have negative long-run consequences.

We saw in Table 24.5, p. 488, that the U.S. government deficit in 2009 was $1.2 trillion. It was clear in 2010 that the United States was facing a huge structural deficit problem. Figure 24.5, p. 490, shows how this problem developed. At the beginning of 2001, the government was running a surplus, and by the end of the year, it was in deficit. Most of this was a cyclical deficit because the economy was in a recession. Deficits persisted after the recession, however, and in the roughly full employment years of 2005–2007, the deficit was between about 1.5 and 2.0 percent of GDP. These deficits were all full employment deficits since the economy was at full employment. The recession hit in 2008 and the deficits soared. The deficit as a percent of GDP reached 9.5 percent in 2009 III, and in 2010, when the economy was beginning to recover from the recession, the percent was still about 9 percent. Although some of the deficit was still cyclical, much was structural.

The large deficits from 2008 on led to a large rise in the ratio of the federal government debt to GDP. In 2010 I the ratio was about 46 percent, up from about 36 percent at the end of 2007. Government projections suggested that the ratio of the federal government debt to GDP could be over 70 percent by 2020. Many talked about the need to raise taxes or cut spending, but there seemed little political will to do so. One problem, discussed at the end of the first section, is that many middle-income taxpayers were angry about the bailout and did not want what they perceived were tax increases to pay for bailing out the rich. At the time of this writing (summer of 2010), there was no long-run plan to deal with the U.S. structural deficit.

What happens if a country like the United States continues to run large structural deficits year after year? Deficits require that the government borrow money to finance them. In the case of the United States, the U.S. Treasury must sell bills and bonds. If the Fed buys them, this increases the money supply, which means that the government is simply financing the deficit by printing money. This is not a viable long-run strategy. It will eventually lead to excess aggregate demand and hyperinflation. If the Treasury is forced to sell the bonds to the U.S. public and foreigners, this may drive down the price of bonds and thus drive up the interest rate on the bonds. High interest rates, other things being equal, increase the government deficit because of higher government interest payments. The government has to hope that the public and foreigners are willing to buy the bonds with only modest decreases in their prices. This can continue for a long time. In 2010 the U.S. Treasury was able to sell large quantities of government bonds with negligible effects on bond prices. The public and foreigners were gobbling them up. Some economists are concerned that this demand may dry up.

One long-run concern from continuing deficits is that interest rates are driven up, thus exacerbating the deficit problem. Another concern is the possibility of a negative reaction from the stock market. If the market perceives that at some point interest rates will rise and that because of this the government will be forced to raise taxes or cut spending, this decreases expected future dividends, which drives down stock prices. So there could be a negative wealth effect even before bond rates begin to rise if the stock market expects this to happen. In short, possible negative asset-market reactions may discipline the long-run deficit strategy of the government. The asset markets may force the government to get its budget in control. This is another constraint on the ability of policy makers to stabilize the economy. If there is a structural deficit problem, policy makers may not have the freedom to lower taxes or raise spending to mitigate a downturn.

Deficit Targeting

The year 2010 was not the first time in which deficit issues played a major role in policy discussions. In the 1980s the U.S. government was spending much more than it was receiving in taxes. In response to the large deficits, in 1986 the U.S. Congress passed and President Reagan signed the Gramm-Rudman-Hollings Act (named for its three congressional sponsors), referred to as GRH. It is interesting to look back on this in the context of the current deficit problem. GRH set...
CHAPTER 30  Financial Crises, Stabilization, and Deficits 611

As Figure 30.6 shows, the deficit was to decline by $36 billion per year between 1987 and 1991, with a deficit of zero slated for fiscal year 1991. What was interesting about the GRH legislation was that the targets were not merely guidelines. If Congress, through its decisions about taxes and spending programs, produced a budget with a deficit larger than the targeted amount, GRH called for automatic spending cuts. The cuts were divided proportionately among most federal spending programs so that a program that made up 5 percent of total spending was to endure a cut equal to 5 percent of the total spending cut.2

In 1986, the U.S. Supreme Court declared part of the GRH bill unconstitutional. In effect, the Court said that Congress would have to approve the "automatic" spending cuts before they could take place. The law was changed in 1986 to meet the Supreme Court ruling and again in 1987, when new targets were established. The new targets had the deficit reaching zero in 1993 instead of 1991. The targets were revised again in 1991, when the year to achieve a zero deficit was changed from 1993 to 1996. In practice, these targets never came close to being achieved. As time wore on, even the revised targets became completely unrealistic, and by the end of the 1980s, the GRH legislation was not taken seriously.

Although the GRH legislation is history, it is useful to consider the stabilization consequences of deficit targeting. What if deficit targeting is taken seriously? Is this good policy? The answer is probably not. We will now show how deficit targeting can make the economy more unstable.

In a world with no deficit targeting, the Congress and the president make decisions each year about how much to spend and how much to tax. The federal government deficit is a result of these decisions and the state of the economy. However, with deficit targeting, the size of the deficit is set in advance. Taxes and government spending must be adjusted to produce the required deficit. In this situation, the deficit is no longer a consequence of the tax and spending decisions. Instead, taxes and spending become a consequence of the deficit decision.

What difference does it make whether Congress chooses a target deficit and adjusts government spending and taxes to achieve that target or decides how much to spend and tax and allows the deficit adjust itself? The difference may be substantial. Consider a leftward shift of the \( AD \) curve caused by some negative demand shock. A negative demand shock is something that causes a negative shift in consumption or investment schedules or that leads to a decrease in U.S. exports.

We know that a leftward shift of the \( AD \) curve lowers aggregate output (income), which causes the government deficit to increase. In a world without deficit targeting, the increase in the deficit during contractions provides an automatic stabilizer for the economy. (Review Chapter 24 if this point is hazy.) The contraction-induced decrease in tax revenues and increase in transfer payments tend to reduce the fall in after-tax income and consumer spending due to the negative demand shock. Thus, the decrease in aggregate output (income) caused by the negative demand shock is lessened somewhat by the growth of the deficit [Figure 30.7(a)].

In a world with deficit targeting, the deficit is not allowed to rise. Some combination of tax increases and government spending cuts would be needed to offset what would have otherwise been an increase in the deficit. We know that increases in taxes or cuts in spending are contractionary in themselves. The contraction in the economy will therefore be larger than it would have been without deficit targeting because the initial effect of the negative demand shock is worsened.
Deficit targeting changes the way the economy responds to negative demand shocks because it does not allow the deficit to increase. The result is a smaller deficit but a larger decline in income than would have otherwise occurred.

Deficit targeting acts as an automatic destabilizer. It requires taxes to be raised and government spending to be cut during a contraction. This reinforces, rather than counteracts, the shock that started the contraction. Deficit targeting thus has undesirable macroeconomic consequences. It requires cuts in spending or increases in taxes at times when the economy is already experiencing problems. This drawback does not mean, of course, that a government should ignore structural deficit problems. But locking in spending cuts or tax increases during periods of negative demand shocks is not a good way to manage the economy. Moving forward, policy makers around the globe will have to devise other methods to control growing structural deficits.

**THE STOCK MARKET, THE HOUSING MARKET, AND FINANCIAL CRISES p. 600**

1. A firm can finance an investment project by borrowing from banks, by issuing bonds, or by issuing new shares of its stock. People who own shares of stock own a fraction of the firm.
2. The price of a stock should equal the discounted value of its expected future dividends, where the discount factors depend on the interest rate and risk.
3. A bubble exists when the price of a stock exceeds the discounted value of its expected future dividends. In this case what matters is what people expect that other people expect about how much the stock can be sold for in the future.
4. The largest stock market boom in U.S. history occurred between 1995 and 2000, when the S&P 500 index rose by 25 percent per year. The boom added $14 trillion to household wealth.
5. Why there was a stock market boom in 1995–2000 appears to be a puzzle. There was nothing unusual about earnings that would predict such a boom. Many people believe that the boom was merely a bubble.
7. Changes in stock prices and housing prices change household wealth, which affects consumption and thus the real economy. Changes in stock and housing prices are largely unpredictable, which makes many fluctuations in the economy unpredictable.

**TIME LAGS REGARDING MONETARY AND FISCAL POLICY p. 606**

8. Stabilization policy describes both fiscal and monetary policy, the goals of which are to smooth out fluctuations in output and employment and to keep prices as stable as possible. Stabilization goals are not necessarily easy to achieve because of the existence of certain time lags, or delays in the response of the economy to macroeconomic policies.
9. A recognition lag is the time it takes for policy makers to recognize the existence of a boom or a slump. An implementation lag is the time it takes to put the desired policy into effect once economists and policy makers recognize that the economy is in a boom or a slump. A response lag is the time it takes for the economy to adjust to the new conditions after a new policy is implemented—in other words, a lag that occurs because of the operation of the economy itself. In general, monetary policy can be implemented more rapidly than fiscal policy but fiscal policy generally has a shorter response lag than monetary policy.

GOVERNMENT DEFICIT ISSUES p. 610

10. The U.S. government was running a large structural deficit in 2010. There was much debate about what to do, but no agreed-upon long-run plan. Large deficits year after year may lead to negative asset-market reactions, such as large decreases in bond and stock prices.

11. In 1986 Congress passed and President Reagan signed the Gramm-Rudman-Hollings Act (GRH), which set deficit targets for each year. The aim was to reduce the large structural deficit that existed.

12. Deficit-targeting measures that call for automatic spending cuts to eliminate or reduce the deficit, like the GRH legislation, may have the effect of destabilizing the economy.

REVIEW TERMS AND CONCEPTS

automatic destabilizers, p. 612
automatic stabilizers, p. 611
capital gain, p. 600
dow Jones Industrial Average, p. 601
Gramm-Rudman-Hollings Act, p. 610
implementation lag, p. 608
NASDAQ Composite, p. 601
realized capital gain, p. 600
recognition lag, p. 608
response lag, p. 608
stabilization policy, p. 606
Standard and Poor’s 500 (S&P 500), p. 601
stock, p. 600
time lags, p. 607

PROBLEMS

All problems are available on www.myeconlab.com

1. In July 2003, the S&P 500 index was at 1,000.
   a. What is the S&P 500 index?
   b. Where is the S&P today?
   c. If you had invested $10,000 in July 2003 and your investments had increased in value by the same percentage as the S&P 500 index had increased, how much would you have today?
   d. Assume that the total stock market holdings of the household sector were about $12 trillion and that the entire stock market went up/down by the same percentage as the S&P 500 index had increased, how much would you have today?

2. During 1997, stock markets in Asia collapsed. Hong Kong’s was down nearly 30 percent, Thailand’s was down 62 percent, and Malaysia’s was down 60 percent. Japan and Korea experienced big drops as well. What impacts would these events have on the economies of the countries themselves? Explain your answer. In what ways would you have expected these events to influence the U.S. economy? How might the spending of Asians on American goods be affected? What about Americans who have invested in these countries?

3. Explain why the government deficit rises as the economy contracts.

4. You are given the following information about the economy in 2010 (all in billions of dollars):
   Consumption function: \( C = 100 + (0.8 \times Y_d) \)
   Taxes: \( T = -150 + (0.25 \times Y) \)
   Investment function: \( I = 60 \)
   Disposable income: \( Y_d = Y - T \)
   Government spending: \( G = 80 \)
   Equilibrium: \( Y = C + I + G \)

   a. Find equilibrium income. Show that the government budget deficit (the difference between government spending and tax revenues) is $5 billion.
   b. Congress passes the Floghorn-Leghorn (F-L) amendment, which requires that the deficit be zero this year. If the budget adopted by Congress has a deficit that is larger than zero, the deficit target must be met by cutting spending. Suppose spending is cut by $5 billion (to $75 billion). What is the new value for equilibrium GDP? What is the new deficit? Explain carefully why the deficit is not zero.
   c. Suppose the F-L amendment was not in effect and planned investment falls to \( I = 55 \). What is the new value of GDP? What is the new government budget deficit? What happens to GDP if the F-L amendment is in effect and spending is cut to reach the deficit target? (Hint: Spending must be cut by $21.666 billion to balance the budget.)
5. Some states are required to balance their budgets. Is this measure stabilizing or destabilizing? Suppose all states were committed to a balanced-budget philosophy and the economy moved into a recession. What effects would this philosophy have on the size of the federal deficit?

6. Explain why stabilization policy may be difficult to carry out. How is it possible that stabilization policies can actually be destabilizing?

7. [Related to the Economics in Practice on p. 603] The housing boom of 2000–2005 created wealth of over $10 trillion. Many claim that the spending of this new wealth prevented a serious recession in the early 2000s. If people spent 4% of that new housing wealth annually by taking out home equity loans or simply saving less, what would be the increase in annual consumption expenditures? (Be careful in counting decimal places.) What would happen to GDP growth as a result?

8. Suppose the government decides to decrease spending and increase taxes in an attempt to decrease its deficit. Is it possible for the Fed to ease the macroeconomic effects of the spending and tax changes? Explain.

9. If the government implements a spending and tax policy in which it promises to neither increase nor decrease spending and taxes, is it still possible for the budget deficit to increase or decrease? Explain.

10. Explain why the implementation lag is generally longer and the response lag is generally shorter for fiscal policy than they are for monetary policy.

11. In August 2010, the Congressional Budget Office (CBO) issued a report estimating that the federal budget deficit for 2010 would exceed $1.3 trillion, or 9.1 percent of GDP. Working under the assumption that current laws affecting the budget will not change (i.e., no revisions in planned tax changes or fiscal stimulus spending), the CBO also estimated that the deficit as a percentage of GDP would fall to 4.2 percent by 2012. Go to www.cbo.gov and look up the current and estimated deficit-to-GDP ratios. Were the CBO’s estimates accurate, and have its projections changed? Explain whether any policy changes enacted since August 2010 might have been responsible for changes in the CBO’s projections.
In Chapters 23 through 29, we considered the interactions of households, firms, and the government in the goods, money, and labor markets. The macroeconomy is complicated, and there is much to learn about these interactions. To keep our discussions as uncomplicated as possible, we assumed simple behavior of households and firms—the two basic decision-making units in the economy. We assumed that household consumption \( C \) depends only on income and that firms’ planned investment \( I \) depends only on the interest rate. We did not consider that households make consumption and labor supply decisions simultaneously and that firms make investment and employment decisions simultaneously.

Now that we understand the basic interactions in the economy, we present a more realistic picture of the influences on households’ consumption and labor supply decisions and on firms’ investment and employment decisions. We then use what we have learned to analyze more macroeconomic issues.

Households: Consumption and Labor Supply Decisions

For most of our analysis so far, we have been assuming that consumption depends simply on income. While this is a useful starting point, it is far from a complete description of the consumption decision of households. We need to consider other theories of consumption to build a more realistic case.

The Life-Cycle Theory of Consumption

Most people make consumption decisions based not only on current income but also on what they expect to earn later in life. Many of you, as young college students, are consuming more than you currently earn as you anticipate future earnings, while a number of your instructors are consuming less than they currently earn as they save for retirement without earnings. The model of consumption that is based on the idea that people track lifetime income when they make consumption decisions is called the life-cycle theory of consumption.

* This chapter is somewhat more advanced, but it contains a lot of interesting information!
The lifetime income and consumption pattern of a representative individual is shown in Figure 31.1. As you can see, this person has a low income during the first part of her life, high income in the middle, and low income again in retirement. Her income in retirement is not zero because she has income from sources other than her own labor—Social Security payments, interest and dividends, and so on.

The consumption path as drawn in Figure 31.1 is constant over the person’s life. This is an extreme assumption, but it illustrates the point that the path of consumption over a lifetime is likely to be more stable than the path of income. We consume an amount greater than our incomes during our early working careers. We do so by borrowing against future income by taking out a car loan, a mortgage to buy a house, or a loan to pay for college. This debt is repaid when our incomes have risen and we can afford to use some of our income to pay off past borrowing without substantially lowering our consumption. The reverse is true for our retirement years. Here, too, our incomes are low. Because we consume less than we earn during our prime working years, we can save up a “nest egg” that allows us to maintain an acceptable standard of living during retirement.

Fluctuations in wealth are also an important component of the life-cycle story. Many young households borrow in anticipation of higher income in the future. Some households actually have negative wealth—the value of their assets is less than the debts they owe. A household in its prime working years saves to pay off debts and to build up assets for its later years, when income typically goes down. Households whose assets are greater than the debts they owe have positive wealth. With its wage earners retired, a household consumes its accumulated wealth. Generally speaking, wealth starts out negative, turns positive, and then approaches zero near the end of life. Wealth, therefore, is intimately linked to the cumulative saving and dissaving behavior of households.

The key difference between the Keynesian theory of consumption and the life-cycle theory is that the life-cycle theory suggests that consumption and saving decisions are likely to be based not only on current income but also on expectations of future income. The consumption behavior of households immediately following World War II clearly supports the life-cycle story. Just after the war ended, income fell as wage earners moved out of war-related work. However, consumption spending did not fall commensurately, as Keynesian theory would predict. People expected to find jobs in other sectors eventually, and they did not adjust their consumption spending to the temporarily lower incomes they were earning in the meantime.

The term permanent income is sometimes used to refer to the average level of a person’s expected future income stream. If you expect your income will be high in the future (even though it may not be high now), your permanent income is said to be high. With this concept, we can sum up the life-cycle theory by saying that current consumption decisions are likely to be based

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**FIGURE 31.1**

Life-Cycle Theory of Consumption

In their early working years, people consume more than they earn. This is also true in the retirement years. In between, people save (consume less than they earn) to pay off debts from borrowing and to accumulate savings for retirement.
on permanent income instead of current income. This means that policy changes such as tax-rate changes are likely to have more of an effect on household behavior if they are expected to be permanent instead of temporary.

One-time tax rebates such as we saw in the United States in 2001 and 2008 provide an interesting test of the permanent income hypothesis. In both cases, the tax rebate was a one-time stimulus. In 2008, for example, the tax rebate was $300 to $600 for individual tax payers eligible for the rebate. How much would we expect this rebate to influence consumption?

The simple Keynesian model that we introduced earlier in this text would just apply the marginal propensity to consume to the $600. If the marginal propensity to consume is .8, we would expect the $600 to generate $480 in incremental spending per rebate. The permanent income hypothesis instead looks at the $600 in the context of an individual’s permanent income. As a fraction of one’s lifetime income, $600 is a modest number, and we would thus expect individuals to increase their spending only modestly in response to the rebate. Research on the 2001 tax rebate by Matthew Shapiro and Joel Slemrod, based on surveys of consumers, suggested that most people planned to use their rebates to lower debt, rather than increase spending.

Although the life-cycle model enriches our understanding of the consumption behavior of households, the analysis is still missing something. What is missing is the other main decision of households: the labor supply decision.

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The Labor Supply Decision

The size of the labor force in an economy is of obvious importance. A growing labor force is one of the ways in which national income/output can be expanded, and the larger the percentage of people who work, the higher the potential output per capita.

So far we have said little about what determines the size of the labor force. Of course, demographics are a key; the number of children born in 2010 will go a long way toward determining the potential number of 20-year-old workers in 2030. In addition, immigration, both legal and illegal, plays a role.

Behavior also plays a role. Households make decisions about whether to work and how much to work. These decisions are closely tied to consumption decisions because for most households, the bulk of their spending is financed out of wages and salaries. Households make consumption and labor supply decisions simultaneously. Consumption cannot be considered separately from labor supply because it is precisely by selling your labor that you earn income to pay for your consumption.

As we discussed in Chapter 3, the alternative to supplying your labor in exchange for a wage or a salary is leisure or other nonmarket activities. Nonmarket activities include raising a child, going to school, keeping a house, or—in a developing economy—working as a subsistence farmer. What determines the quantity of labor supplied by a household? Among the list of factors are the wage rate, prices, wealth, and nonlabor income.

The Wage Rate

A changing wage rate can affect labor supply, but whether the effect is positive or negative is ambiguous. An increase in the wage rate affects a household in two ways. First, work becomes more attractive relative to leisure and other nonmarket activities. Because every hour spent in leisure now requires giving up a higher wage, the opportunity cost of leisure is higher. As a result, you would expect that a higher wage would lead to a larger quantity of labor supplied—a larger workforce. This is called the substitution effect of a wage rate increase.

On the other hand, household members who work are clearly better off after a wage rate increase. By working the same number of hours as they did before, they will earn more income. If we assume that leisure is a normal good, people with higher income will spend some of it on leisure by working less. This is the income effect of a wage rate increase.

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1 The pioneering work on this topic was done by Milton Friedman, *A Theory of the Consumption Function* (Princeton, NJ: Princeton University Press, 1957). In the mid-1960s, Franco Modigliani did closely related work that included the formulation of the life-cycle theory.
When wage rates rise, the substitution effect suggests that people will work more, while the income effect suggests that they will work less. The ultimate effect depends on which separate effect is more powerful. The data suggest that the substitution effect seems to win in most cases. That is, higher wage rates usually lead to a larger labor supply and lower wage rates usually lead to a lower labor supply.

**Prices**  Prices also play a major role in the consumption/labor supply decision. In our discussions of the possible effects of an increase in the wage rate, we have been assuming that the prices of goods and services do not rise at the same time. If the wage rate and all other prices rise simultaneously, the story is different. To make things clear, we need to distinguish between the nominal wage rate and the real wage rate.

The **nominal wage rate** is the wage rate in current dollars. When we adjust the nominal wage rate for changes in the price level, we obtain the **real wage rate**. The real wage rate measures the amount that wages can buy in terms of goods and services. Workers do not care about their nominal wage—they care about the purchasing power of this wage—the real wage.

Suppose skilled workers in Indianapolis were paid a wage rate of $20 per hour in 2010. Now suppose their wage rate rose to $22 in 2011, a 10 percent increase. If the prices of goods and services were the same in 2011 as they were in 2010, the real wage rate would have increased by 10 percent. An hour of work in 2011 ($22) buys 10 percent more than an hour of work in 2010 ($20). What if the prices of all goods and services also increased by 10 percent between 2010 and 2011? The purchasing power of an hour’s wages has not changed. The real wage rate has not increased at all. In 2011, $22 bought the same quantity of goods and services that $20 bought in 2010.

To measure the real wage rate, we adjust the nominal wage rate with a price index. As we saw in Chapter 22, there are several such indexes that we might use, including the consumer price index and the GDP price index.\(^2\)

We can now apply what we have learned from the life-cycle theory to our wage/price story. Recall that the life-cycle theory says that people look ahead in making their decisions. Translated to real wage rates, this idea says that households look at expected future real wage rates as well as the current real wage rate in making their current consumption and labor supply decisions. Consider, for example, medical students who expect that their real wage rate will be higher in the future. This expectation obviously has an effect on current decisions about things like how much to buy and whether to take a part-time job.

**Wealth and Nonlabor Income**  Life-cycle theory implies that wealth fluctuates over the life cycle. Households accumulate wealth during their working years to pay off debts accumulated when they were young and to support themselves in retirement. This role of wealth is clear, but the existence of wealth poses another question. Consider two households that are at the same stage in their life cycle and have similar expectations about future wage rates, prices, and so on. They expect to live the same length of time, and both plan to leave the same amount to their children. They differ only in their wealth. Because of a past inheritance, household 1 has more wealth than household 2. Which household is likely to have a higher consumption path for the rest of its life? Household 1 is because it has more wealth to spread out over the rest of its life. Holding everything else constant (including the stage in the life cycle), the more wealth a household has, the more it will consume both now and in the future.

Now consider a household that has a sudden unexpected increase in wealth, perhaps an inheritance from a distant relative. How will the household’s consumption pattern be affected? Few spend the entire inheritance all at once. Most households will increase consumption both now and in the future, spending the inheritance over the course of the rest of their lives.

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\(^2\) To calculate the real wage rate, we divide the nominal wage rate by the price index. Suppose the wage rate rose from $10 per hour in 1998 to $18 per hour in 2010 and the price level rose 50 percent during the same period. Using 1998 as the base year, the price index would be 1.00 in 1998 and 1.50 in 2010. The real wage rate is \(\frac{W}{P}\), where \(W\) is the nominal wage rate and \(P\) is the price level. Using 1998 as the base year, the real wage rate is $10 in 1998 ($10.00/1.00) and $12 in 2010 ($18.00/1.50).
An increase in wealth can also be looked on as an increase in nonlabor income. Nonlabor, or nonwage, income is income received from sources other than working—inheritances, interest, dividends, and transfer payments such as welfare payments and Social Security payments. As with wealth, an unexpected increase in nonlabor income will have a positive effect on a household’s consumption.

What about the effect of an increase in wealth or nonlabor income on labor supply? We already know that an increase in income results in an increase in the consumption of normal goods, including leisure. Therefore, an unexpected increase in wealth or nonlabor income results in an increase in consumption and an increase in leisure. With leisure increasing, labor supply must fall. So an unexpected increase in wealth or nonlabor income leads to a decrease in labor supply. This point should be obvious. If you suddenly win a million dollars in the state lottery or make a killing in the stock market, you will probably work less in the future than you otherwise would have.

**Interest Rate Effects on Consumption**

Recall from the last few chapters that the interest rate affects a firm’s investment decision. A higher interest rate leads to a lower level of planned investment and vice versa. This was a key link between the money market and the goods market, and it was the channel through which monetary policy had an impact on planned aggregate expenditure.

We can now expand on this link: The interest rate also affects household behavior. Consider the effect of a fall in the interest rate on consumption. A fall in the interest rate lowers the reward to saving. If the interest rate falls from 10 percent to 5 percent, you earn 5¢ instead of 10¢ per year on every dollar saved. This means that the opportunity cost of spending a dollar today (instead of saving it and consuming it plus the interest income a year from now) has fallen. You will substitute toward current consumption and away from future consumption when the interest rate falls: You consume more today and save less. A rise in the interest rate leads you to consume less today and save more. This effect is called the substitution effect.

There is also an income effect of an interest rate change on consumption. If a household has positive wealth and is earning interest on that wealth, a fall in the interest rate leads to a fall in interest income. This is a decrease in its nonlabor income, which, as we just saw, has a negative effect on consumption. For households with positive wealth, the income effect works in the opposite direction from the substitution effect. On the other hand, if a household is a debtor and is paying interest on its debt, a fall in the interest rate will lead to a fall in interest payments. The household is better off in this case and will consume more. In this case, the income and substitution effects work in the same direction. The total household sector in the United States has positive wealth, and so in the aggregate, the income and substitution effects work in the opposite direction.

On balance, the data suggest that the substitution effect dominates the income effect so that the interest rate has a negative net effect on consumption: Interest rate increases cause consumption to fall. There is also some evidence, however, that the income effect is getting larger over time. U.S. households own most of the U.S. government debt, and the size of this debt has increased dramatically in the last 25 years. This means that the change in government interest payments (and so the change in household interest income) is now larger for a given change in interest rates than before, which leads to a larger income effect than before for a given change in interest rates. On net, this tells us that interest rate increases will cause consumption to fall less as the income effect grows.

**Government Effects on Consumption and Labor Supply: Taxes and Transfers**

The government influences household behavior mainly through income tax rates and transfer payments. When the government raises income tax rates, after-tax real wages decrease, lowering consumption. When the government lowers income tax rates, after-tax real wages increase, raising consumption. A change in income tax rates also affects labor supply. If the substitution effect dominates, as we are generally assuming, an increase in income tax rates, which lowers after-tax wages, will lower labor supply. A decrease in income tax rates will increase labor supply.
Transfer payments are payments such as Social Security benefits, veterans’ benefits, and welfare benefits. An increase in transfer payments is an increase in nonlabor income, which we have seen has a positive effect on consumption and a negative effect on labor supply. Increases in transfer payments thus increase consumption and decrease labor supply, while decreases in transfer payments decrease consumption and increase labor supply. Table 31.1 summarizes these results.

### Table 31.1 The Effects of Government on Household Consumption and Labor Supply

<table>
<thead>
<tr>
<th>Income Tax Rates</th>
<th>Transfer Payments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Increase</strong></td>
<td><strong>Decrease</strong></td>
</tr>
<tr>
<td><strong>Increase</strong></td>
<td><strong>Decrease</strong></td>
</tr>
</tbody>
</table>

- Effect on consumption: Negative, Positive
- Effect on labor supply: Positive, Negative

*If the substitution effect dominates.

**Note:** The effects are larger if they are expected to be permanent instead of temporary.

### A Possible Employment Constraint on Households

Our discussion of the labor supply decision has so far proceeded as if households were free to choose how much to work each period. If a member of a household decides to work an additional 5 hours a week at the current wage rate, we have assumed that the person can work 5 hours more—that work is available. If someone who has not been working decides to work at the current wage rate, we have assumed that the person can find a job.

There are times when these assumptions do not hold. The Great Depression, when unemployment rates reached 25 percent of the labor force, led to the birth of macroeconomics in the 1930s. Since the mid-1970s, the United States has experienced five recessions, with high unemployment rates. When there is unemployment, some households feel an additional constraint on their behavior. Some people may want to work 40 hours per week at the current wage rates but may find only part-time work. Others may not find any work at all.

How does a household respond when it is constrained from working as much as it would like? It consumes less. If your current wage rate is $10 per hour and you normally work 40 hours a week, your normal income from wages is $400 per week. If your average tax rate is 20 percent, your after-tax wage income is $320 per week. You are likely to spend much of this income during the week. If you are prevented from working, this income will not be available to you and you will have less to spend. You will spend something, of course. You may receive some form of nonlabor income, and you may have assets such as savings deposits or stocks and bonds that can be withdrawn or sold. You also may be able to borrow during your period of unemployment. Even though you will spend something during the week, you almost certainly will spend less than you would have if you had your usual income of $320 in after-tax wages.

A household constrained from working as much as it would like faces a different decision from the decision facing a household that can work as much as it wants. The work decision of the former household is, in effect, forced on it. The household works as much as it can—a certain number of hours per week or perhaps none at all—but this amount is less than the household would choose to work at the current wage rate if it could find more work. The amount that a household would like to work at the current wage rate if it could find the work is called its unconstrained supply of labor. The amount that the household actually works in a given period at current wage rates is called its constrained supply of labor.

A household’s constrained supply of labor is not a variable over which it has any control. The amount of labor the household supplies is imposed on it from the outside by the workings of the economy. However, the household’s consumption is under its control. We have just seen that the less a household works—that is, the smaller the household’s constrained supply of labor is—the lower its consumption. Constraints on the supply of labor are an important determinant of consumption when there is unemployment.

**Keynesian Theory Revisited** Recall the Keynesian theory that current income determines current consumption. We now know the consumption decision is made jointly with the labor supply decision and the two depend on the real wage rate. It is incorrect to
think that consumption depends only on income, at least when there is full employment. However, if there is unemployment, Keynes is closer to being correct because the level of income (at least workers’ income) depends exclusively on the employment decisions made by firms and not on household decisions. In this case, it is income that affects consumption, not the wage rate. For this reason Keynesian theory is considered to pertain to periods of unemployment. It was, of course, precisely during such a period that the theory was developed.

**A Summary of Household Behavior**

This completes our discussion of household behavior in the macroeconomy. Household consumption depends on more than current income. Households determine consumption and labor supply simultaneously, and they look ahead in making their decisions.

The following factors affect household consumption and labor supply decisions:

- Current and expected future real wage rates
- Initial value of wealth
- Current and expected future nonlabor income
- Interest rates
- Current and expected future tax rates and transfer payments

If households are constrained in their labor supply decisions, income is directly determined by firms’ hiring decisions. In this case, we can say (in the traditional, Keynesian way) that “income” affects consumption.

**The Household Sector Since 1970**

To better understand household behavior, let us examine how some of the aggregate household variables have changed over time. We will discuss the period 1970 I–2010 I. (Remember, Roman numerals refer to quarters, that is, 1970 I means the first quarter of 1970.) Within this span, there have been five recessionary periods: 1974 I–1975 I, 1980 II–1982 IV, 1990 III–1991 I, 2001 I–2001 III, and 2008 I–2009 II. How did the household variables behave during each period?

**Consumption** Data on the total consumption of the household sector are in the national income accounts. As we saw in Table 21.2 on p. 426, personal consumption expenditures accounted for 70.8 percent of GDP in 2009. The three basic categories of consumption expenditures are services, nondurable goods, and durable goods.

Figure 31.2 plots the data for consumption expenditures on services and nondurable goods combined and for consumption expenditures on durable goods. The variables are in real terms.
You can see that expenditures on services and nondurable goods are “smoother” over time than expenditures on durable goods. For example, the decrease in expenditures on services and nondurable goods was much smaller during the five recessionary periods than the decrease in expenditures on durable goods.

Why do expenditures on durables fluctuate more than expenditures on services and nondurables? When times are bad, people can postpone the purchase of durable goods, which they do. It follows that expenditures on these goods change the most. When times are tough, you do not have to have a new car or a new washer-dryer; you can make do with your old Chevy or Maytag until things get better. When your income falls, it is not as easy to postpone the service costs of day care or health care. Nondurables fall into an intermediate category, with some items (such as new clothes) easier to postpone than others (such as food).

**Housing Investment** Another important expenditure of the household sector is housing investment (purchases of new housing), plotted in Figure 31.3. Housing investment is the most easily postponable of all household expenditures, and it has large fluctuations. The fluctuations are remarkable between 2003 and 2010. Housing investment rose rapidly between 2003 and 2005 and then came crashing down. As discussed in Chapter 30, much of this was driven by a huge increase and then decrease in housing prices.

**Labor Supply** As we noted in Chapters 22 and 29, a person is considered a part of the labor force when he or she is working or has been actively looking for work in the past few weeks. The ratio of the labor force to the total working-age population—those 16 and over—is the labor force participation rate.
It is informative to divide the labor force into three categories: males 25 to 54, females 25 to 54, and all others 16 and over. Ages 25 to 54 are sometimes called "prime" ages, presuming that a person is in the prime of working life during these ages. The participation rates for these three groups are plotted in Figure 31.4.

As the figure shows, most men of prime age are in the labor force, although the participation rate has fallen since 1970—from .961 in 1970 I to .892 in 2010 I. (A rate of .892 means that 89.2 percent of prime-age men were in the labor force.) The participation rate for prime-age women, on the other hand, rose dramatically between 1970 and 1990—from .501 in 1970 I to .741 in 1990 I. Although economic factors account for some of this increase, a change in social attitudes and preferences probably explains much of the increase. Since 1990, the participation rate for prime-age women has changed very little. In 2010 I, it was .757, still considerably below the .892 rate for prime-age men.

Figure 31.4 also shows the participation rate for all individuals 16 and over except prime-age men and women. This rate has some cyclical features—it tends to fall in recessions and to rise or fall less during expansions. These features reveal the operation of the discouraged-worker effect, discussed in Chapter 22. During recessions, some people get discouraged about ever finding a job. They stop looking and are then not considered a part of the labor force. During expansions, people become encouraged again. Once they begin looking for jobs, they are again considered a part of the labor force. Because prime-age women and men are likely to be fairly attached to the labor force, the discouraged-worker effect for them is quite small.
Firms: Investment and Employment Decisions

Having taken a closer look at the behavior of households in the macroeconomy, we now look more closely at the behavior of firms—the other major decision-making unit in the economy. In discussing firm behavior earlier, we assumed that planned investment depends only on the interest rate. However, there are several other determinants of planned investment. We now discuss them and the factors that affect firms’ employment decisions. Once again, microeconomic theory can help us gain some insight into the working of the macroeconomy.

In a market economy, firms determine which goods and services are available to consumers today and which will be available in the future, how many workers are needed for what kinds of jobs, and how much investment will be undertaken. Stated in macroeconomic terms, the decisions of firms, taken together, determine output, labor demand, and investment.

Expectations and Animal Spirits

Time is a key factor in investment decisions. Capital has a life that typically extends over many years. A developer who decides to build an office tower is making an investment that will be around (barring earthquakes, floods, or tornadoes) for several decades. In deciding where to build a plant, a manufacturing firm is committing a large amount of resources to purchase capital that will presumably yield services over a long time. Furthermore, the decision to build a plant or to purchase large equipment must often be made years before the actual project is completed. Whereas the acquisition of a small business computer may take only a few days, the planning process for downtown developments in large U.S. cities has been known to take decades.

For these reasons, investment decisions require looking into the future and forming expectations about it. In forming their expectations, firms consider numerous factors. At a minimum, they gather information about the demand for their specific products, about what their competitors are planning, and about the macroeconomy’s overall health. A firm is not likely to increase its production capacity if it does not expect to sell more of its product in the future. Hilton will not put up a new hotel if it does not expect to fill the rooms at a profitable rate. Ford will not build a new plant if it expects the economy to enter a long recession.

Forecasting the future is fraught with dangers. Many events cannot be foreseen. Investments are therefore always made with imperfect knowledge. Keynes pointed this out in 1936:

> The outstanding fact is the extreme precariousness of the basis of knowledge on which our estimates of prospective yield have to be made. Our knowledge of the factors which will govern the yield of an investment some years hence is usually very slight and often negligible. If we speak frankly, we have to admit that our basis of knowledge for estimating the yield ten years hence of a railway, a copper mine, a textile factory, the goodwill of a patent medicine, an Atlantic liner, a building in the City of London amounts to little and sometimes nothing.

Keynes concludes from this line of thought that much investment activity depends on psychology and on what he calls the **animal spirits of entrepreneurs**:

> Our decisions . . . can only be taken as a result of animal spirits. In estimating the prospects of investment, we must have regard, therefore, to nerves and hysteria and even the digestions and reactions to the weather of those upon whose spontaneous activity it largely depends.3

Because expectations about the future are, as Keynes points out, subject to great uncertainty, they may change often. Thus, animal spirits help to make investment a volatile component of GDP.

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The Accelerator Effect

Expectations, at least in part, are thus likely to determine the level of planned investment spending. At any interest rate, the level of investment is likely to be higher if businesses are optimistic and lower if they are pessimistic. A key question is then what determine expectations? One possibility, is that expectations are optimistic when aggregate output ($Y$) is rising and pessimistic when aggregate output is falling. At any given level of the interest rate, expectations may be more optimistic and planned investment higher when output is growing rapidly than when it is growing slowly or falling. It is easy to see why this might be so. When firms expect future prospects to be good, they may plan now to add productive capacity, and one indicator of future prospects is the current growth rate.

If this is the case, the result will be what is called an accelerator effect. If aggregate output (income) ($Y$) is rising, investment will increase even though the level of $Y$ may be low. Higher investment spending leads to an added increase in output, further “accelerating” the growth of aggregate output. If $Y$ is falling, expectations are dampened and investment spending will be cut even though the level of $Y$ may be high, accelerating the decline.

Excess Labor and Excess Capital Effects

In practice, firms appear at times to hold what we will call excess labor and/or excess capital. A firm holds excess labor (or capital) if it can reduce the amount of labor it employs (or capital it holds) and still produce the same amount of output. Why would a firm want to employ more workers or have more capital on hand than it needs? Both labor and capital are costly—a firm has to pay wages to its workers, and it forgoes interest on funds tied up in machinery or buildings. Why would a firm want to incur costs that do not yield revenue?

To see why, suppose a firm suffers a sudden and large decrease in sales, but it expects the lower sales level to last only a few months, after which it believes sales will pick up again. In this case, the firm is likely to lower production in response to the sales change to avoid too large an increase in its stock of inventories. This decrease in production means that the firm could get rid of some workers and some machines because it needs less labor and less capital to produce the now-lower level of output.

However, things are not that simple. Decreasing its workforce and capital stock quickly can be costly for a firm. Abrupt cuts in the workforce hurt worker morale and may increase personnel administration costs, and abrupt reductions in capital stock may be disadvantageous because of the difficulty of selling used machines. These types of costs are sometimes called adjustment costs because they are the costs of adjusting to the new level of output. There are also adjustment costs to increasing output. For example, it is usually costly to recruit and train new workers.

Adjustment costs may be large enough that a firm chooses not to decrease its workforce and capital stock when production falls. The firm may at times choose to have more labor and capital on hand than it needs to produce its current amount of output simply because getting rid of them is more costly than keeping them. In practice, excess labor takes the form of workers not working at their normal level of activity (more coffee breaks and more idle time, for instance). Some of this excess labor may receive new training so that productivity will be higher when production picks up again.

The existence of excess labor and capital at any given moment is likely to affect future employment and investment decisions. Suppose a firm already has excess labor and capital due to a fall in its sales and production. When production picks up again, the firm will not need to hire as many new workers or acquire as much new capital as it would otherwise. The more excess capital a firm already has, the less likely it is to invest in new capital in the future. The more excess labor it has, the less likely it is to hire new workers in the future.

Inventory Investment

We now turn to a brief discussion of the inventory investment decision. Inventory investment is the change in the stock of inventories. Although inventory investment is another way in which a firm adds to its capital stock, the inventory investment decision is quite different from the plant-and-equipment investment decision.

The Role of Inventories

Recall the distinction between a firm’s sales and its output. If a firm can hold goods in inventory, which is usually the case unless the good is perishable or unless the firm produces services, then within a given period, it can sell a quantity of goods that differs from...
the quantity of goods it produces during that period. When a firm sells more than it produces, its stock of inventories decreases; when it sells less than it produces, its stock of inventories increases.

\[
\text{Stock of inventories (end of period)} = \text{Stock of inventories (beginning of period)} + \text{Production} - \text{Sales}
\]

If a firm starts a period with 100 umbrellas in inventory, produces 15 umbrellas during the period, and sells 10 umbrellas in this same interval, it will have 105 umbrellas \((100 + 15 - 10)\) in inventory at the end of the period. A change in the stock of inventories is actually investment because inventories are counted as part of a firm’s capital stock. In our example, inventory investment during the period is a positive number, 5 umbrellas \((105 - 100)\). When the number of goods produced is less than the number of goods sold, such as 5 produced and 10 sold, inventory investment is negative.

**The Optimal Inventory Policy**  We can now consider firms’ inventory decisions. Firms are concerned with what they are going to sell and produce in the future as well as what they are selling and producing currently. At each point in time, a firm has some idea of how much it is going to sell in the current period and in future periods. Given these expectations and its knowledge of how much of its good it already has in stock, a firm must decide how much to produce in the current period. Inventories are costly to a firm because they take up space and they tie up funds that could be earning interest. However, if a firm’s stock of inventories gets too low, the firm may have difficulty meeting the demand for its product, especially if demand increases unexpectedly. The firm may lose sales. The point between too low and too high a stock of inventory is called the desired, or optimal, level of inventories. This is the level at which the extra cost (in lost sales) from decreasing inventories by a small amount is just equal to the extra gain (in interest revenue and decreased storage costs).

A firm that had no costs other than inventory costs would always aim to produce in a period exactly the volume of goods necessary to make its stock of inventories at the end of the period equal to the desired stock. If the stock of inventory fell lower than desired, the firm would produce more than it expected to sell to bring the stock up. If the stock of inventory grew above the desired level, the firm would produce less than it expected to sell to reduce the stock.

There are other costs to running a firm besides inventory costs. In particular, large and abrupt changes in production can be very costly because it is often disruptive to change a production process geared to a certain rate of output. If production is to be increased, there may be adjustment costs for hiring more labor and increasing the capital stock. If production is to be decreased, there may be adjustment costs in laying off workers and decreasing the capital stock.

Because holding inventories and changing production levels are both costly, firms face a trade-off between them. Because of adjustment costs, a firm is likely to smooth its production path relative to its sales path. This means that a firm is likely to have its production fluctuate less than its sales, with changes in inventories to absorb the difference each period. However, because there are incentives not to stray too far from the optimal level of inventories, fluctuations in production are not eliminated completely. Production is still likely to fluctuate, just not as much as sales fluctuate.

Two other points need to be made here. First, if a firm’s stock of inventories is unusually or unexpectedly high, the firm is likely to produce less in the future than it otherwise would have in order to decrease its high stock of inventories. In other words, although the stock of inventories fluctuates over time because production is smoothed relative to sales, at any point in time, inventories may be unexpectedly high or low because sales have been unexpectedly low or high. An unexpectedly high stock will have a negative effect on production in the future, and an unexpectedly low stock will have a positive effect on production in the future. An unexpected increase in inventories has a negative effect on future production, and an unexpected decrease in inventories has a positive effect on future production.

Second, firms do not know their future sales exactly. They have expectations of future sales, and these expectations may not turn out to be exactly right. This has important consequences. If sales turn out to be less than expected, inventories will be higher than expected and there will be less production in the future. Furthermore, future sales expectations are likely to have an important effect on current production. If a firm expects its sales to be high in the future, it will adjust its planned production path accordingly. Even though a firm smooths production relative to sales, over a long time, it must produce as much as it sells. If it does not, it will eventually run out
of inventories. The level of a firm’s planned production path depends on the level of its expected future sales path. If a firm’s expectations of the level of its future sales path decrease, the firm is likely to decrease the level of its planned production path, including its actual production in the current period. Current production depends on expected future sales.

Because production is likely to depend on expectations of the future, animal spirits may play a role. If firms become more optimistic about the future, they are likely to produce more now. Keynes’s view that animal spirits affect investment is also likely to pertain to output.

A Summary of Firm Behavior

The following factors affect firms’ investment and employment decisions:

- Firms’ expectations of future output
- Wage rate and cost of capital (the interest rate is an important component of the cost of capital)
- Amount of excess labor and excess capital on hand

The most important points to remember about the relationship among production, sales, and inventory investment are

- Inventory investment—that is, the change in the stock of inventories—that equals production minus sales.
- An unexpected increase in the stock of inventories has a negative effect on future production.
- Current production depends on expected future sales.

The Firm Sector Since 1970

To close our discussion of firm behavior, we now examine some aggregate investment and employment variables for the period 1970 I–2010 I.

Plant-and-Equipment Investment  
Plant-and-equipment investment by the firm sector is plotted in Figure 31.5. Investment fared poorly in the five recessionary periods after 1970. This observation is consistent with the observation that investment depends in part on output. An examination of the plot of real GDP in Figure 20.4 on p. 418 and the plot of investment in Figure 31.5 shows that investment generally does poorly when GDP does poorly and that investment generally does well when GDP does well.

Figure 31.5 also shows that investment fluctuates greatly. This is not surprising. The animal spirits of entrepreneurs are likely to be volatile, and if animal spirits affect investment, it follows that investment too will be volatile.

Despite the volatility of plant-and-equipment investment, however, it is still true that housing investment fluctuates more than plant-and-equipment investment (as you can see by

**FIGURE 31.5**
Overall, plant-and-equipment investment declined in the five recessionary periods since 1970.
comparing Figures 31.3 and 31.5). Plant-and-equipment investment is not the most volatile component of GDP.

**Employment** Employment in the firm sector is plotted in Figure 31.6, which shows that employment fell in all five recessionary periods. This is consistent with the theory that employment depends in part on output. Otherwise, employment has grown over time in response to the growing economy. Employment in the firm sector rose from 72.6 million in 1970 I to 132.8 million in 2007 IV (before the recession of 2008-2009). During the 2008-2009 recession employment fell by 9.4 million—from 131.9 million in 2007 IV to 122.5 million in 2009 IV.

**Inventory Investment** Recall that inventory investment is the difference between the level of output and the level of sales. Recall also that some inventory investment is usually unplanned. This occurs when the actual level of sales is different from the expected level of sales.

Inventory investment of the firm sector is plotted in Figure 31.7. Also plotted in this figure is the ratio of the stock of inventories to the level of sales—the inventory/sales ratio. The figure shows that inventory investment is very volatile—more volatile than housing investment and plant-and-equipment investment. Some of this volatility is undoubtedly due to the unplanned component of inventory investment, which is likely to fluctuate greatly from one period to the next.

When the inventory/sales ratio is high, the actual stock of inventories is likely to be larger than the desired stock. In such a case, firms have overestimated demand and produced too much relative to sales and they are likely to want to produce less in the future to draw down their stock. You can find several examples of this trend in Figure 31.7—the clearest occurred during the 1974-1975 period. At the end of 1974, the stock of inventories was very high relative to sales, an indication that firms probably had undesired inventories at the end of 1974. In 1975, firms worked off these undesired inventories by producing less than they sold. Thus, inventory investment was very low in 1975. The year 1975 is clearly a year in which output would have been higher had the stock of inventories at the beginning of the year not been so high. There were large declines in inventory investment in the recessions of 2001 and 2008-2009.

On average, the inventory/sales ratio has been declining over time, evidence that firms are becoming more efficient in their management of inventory stocks. Firms are becoming more efficient in the sense of being able (other things equal) to hold smaller and smaller stocks of inventories relative to sales.

![FIGURE 31.6 Employment in the Firm Sector, 1970 I–2010 I](image)

Growth in employment was generally negative in the five recessions the U.S. economy has experienced since 1970.
Productivity and the Business Cycle

We can now use what we have just learned about firm behavior to analyze movements in productivity. **Productivity**, sometimes called **labor productivity**, is defined as output per worker hour. If output is $Y$ and the number of hours worked in the economy is $H$, productivity is $Y/H$. Simply stated, productivity measures how much output an average worker produces per hour.

Productivity fluctuates over the business cycle, tending to rise during expansions and fall during contractions. See Figure 22.2 on p. 453 for a plot of productivity for 1952 I–2010 I. You can see from this figure that productivity fluctuates up and down around a positive trend. The fact that firms at times hold excess labor explains why productivity fluctuates in the same direction as output.

Figure 31.8 shows the pattern of employment and output over time for a hypothetical economy. Employment does not fluctuate as much as output over the business cycle. It is precisely this pattern that leads to higher productivity during periods of high output and lower productivity during periods of low output. During expansions in the economy, output rises by a larger percentage than employment and the ratio of output to workers rises. During downswings, output falls faster than employment and the ratio of output to workers falls.

The existence of excess labor when the economy is in a slump means that productivity as measured by the ratio $Y/H$ tends to fall at such times. Does this trend mean that labor is in some sense “less...
The decline in the measured unemployment rate that results when people who want to work but cannot find work grow discouraged and stop looking, dropping out of the ranks of the unemployed and the labor force.

**Okun’s Law** The theory, put forth by Arthur Okun, that in the short run the unemployment rate decreases about 1 percentage point for every 3 percent increase in real GDP. Later research and data have shown that the relationship between output and unemployment is not as stable as Okun’s “Law” predicts.

**discouraged-worker effect** The decline in the measured unemployment rate that results when people who want to work but cannot find work grow discouraged and stop looking, dropping out of the ranks of the unemployed and the labor force.

The unemployment rate is 1 minus the employment rate, \( E/L \).

**The Short-Run Relationship Between Output and Unemployment**

We can also use what we have learned about household and firm behavior to analyze the relationship between output and unemployment. When we discussed the connections between the \( AS/AD \) diagram and the Phillips Curve in Chapter 29, we mentioned that output \( (Y) \) and the unemployment rate \( (U) \) are inversely related. When output rises, the unemployment rate falls, and when output falls, the unemployment rate rises. At one time, it was believed that the short-run relationship between the two variables was fairly stable. Okun’s Law (after U.S. economist Arthur Okun, who first studied the relationship) stated that in the short run the unemployment rate decreased about 1 percentage point for every 3 percent increase in real GDP. As with the Phillips Curve, Okun’s Law has not turned out to be a “law.” The economy is far too complex for there to be such a simple and stable relationship between two macroeconomic variables.

Although the short-run relationship between output and the unemployment rate is not the simple relationship Okun believed, it is true that a 1 percent increase in output tends to correspond to a less than 1 percentage point decrease in the unemployment rate in the short run. In other words, there are a number of “slippages” between changes in output and changes in the unemployment rate.

The first slippage is between the change in output and the change in the number of jobs in the economy. When output increases by 1 percent, the number of jobs does not tend to rise by 1 percent in the short run. There are two reasons for this. First, a firm is likely to meet some of the increase in output by increasing the number of hours worked per job. Instead of having the labor force work 40 hours per week, the firm may pay overtime and have the labor force work 42 hours per week. Second, if a firm is holding excess labor at the time of the output increase, at least part of the increase in output can come from putting the excess labor back to work. For both reasons, the number of jobs is likely to rise by a smaller percentage than the increase in output.

The second slippage is between the change in the number of jobs and the change in the number of people employed. If you have two jobs, you are counted twice in the job data but only once in the persons-employed data. Because some people have two jobs, there are more jobs than there are people employed. When the number of jobs increases, some of the new jobs are filled by people who already have one job (instead of by people who are unemployed). This means that the increase in the number of people employed is less than the increase in the number of jobs. This is a slippage between output and the unemployment rate because the unemployment rate is calculated from data on the number of people employed, not the number of jobs.

The third slippage concerns the response of the labor force to an increase in output. Let \( E \) denote the number of people employed, let \( L \) denote the number of people in the labor force, and let \( u \) denote the unemployment rate. In these terms, the unemployment rate is

\[
u = 1 - E/L\]

The unemployment rate is 1 minus the employment rate, \( E/L \).

When we discussed how the unemployment rate is measured in Chapter 22, we introduced the discouraged-worker effect. A discouraged worker is one who would like a job but has stopped looking because the prospects seem so bleak. When output increases, job prospects begin to look better and some people who had stopped looking for work begin looking again. When they do, they are once again counted as part of the labor force. The labor force increases when output increases because discouraged workers are moving back into the labor force. This is another reason the unemployment rate does not fall as much as might be expected when output increases.

These three slippages show that the link from changes in output to changes in the unemployment rate is complicated. All three combine to make the change in the unemployment rate less than the percentage change in output in the short run. They also show that the relationship between changes in output and changes in the unemployment rate is not likely to be stable. The size of the first slippage, for example, depends on how much excess labor is being held at the time of the output
increase, and the size of the third slippage depends on what else is affecting the labor force (such as changes in real wage rates) at the time of the output increase. The relationship between output and unemployment depends on the state of the economy at the time of the output change.

The Size of the Multiplier

We can finally bring together the material in this chapter and in previous chapters to consider the size of the multiplier. We mentioned in Chapter 23 that much of the analysis we would do after deriving the simple multiplier would have the effect of decreasing the size of the multiplier. We can now summarize why.

1. There are automatic stabilizers. We saw in the Appendix to Chapter 24 that if taxes are not a fixed amount but instead depend on income (which is surely the case in practice), the size of the multiplier is decreased. When the economy expands and income increases, the amount of taxes collected increases. The rise in taxes acts to offset some of the expansion (thus, a smaller multiplier). When the economy contracts and income decreases, the amount of taxes collected decreases. This decrease in taxes helps to lessen the contraction. Some transfer payments also respond to the state of the economy and act as automatic stabilizers, lowering the value of the multiplier. Unemployment benefits are the best example of transfer payments that increase during contractions and decrease during expansions.

2. There is the interest rate. We saw in Chapter 27 that if government spending increases and the money supply remains unchanged, the interest rate increases, which decreases planned investment and aggregate output (income). This crowding out of planned investment decreases the value of the multiplier. As we saw earlier in this chapter, increases in the interest rate also have a negative effect on consumption. Consumption is also crowded out in the same way that planned investment is, and this effect lowers the value of the multiplier even further.

3. There is the response of the price level. We also saw in Chapter 27 that some of the effect of an expansionary policy is to increase the price level. The multiplier is smaller because of this price response. The multiplier is particularly small when the economy is on the steep part of the AS curve, where most of the effect of an expansionary policy is to increase prices.

4. There are excess capital and excess labor. When firms are holding excess labor and capital, part of any output increase can come from putting the excess labor and capital back to work instead of increasing employment and investment. This lowers the value of the multiplier because (1) investment increases less than it would have if there were no excess capital and (2) consumption increases less than it would have if employment (and thus household income) had increased more.

5. There are inventories. Part of any initial increase in sales can come from drawing down inventories instead of increasing output. To the extent that firms draw down their inventories in the short run, the value of the multiplier is lower because output does not respond as quickly to demand changes.

6. There are people’s expectations about the future. People look ahead, and they respond less to temporary changes than to permanent changes. The multiplier effects for policy changes perceived to be temporary are smaller than those for policy changes perceived to be permanent.

The Size of the Multiplier in Practice

In practice, the multiplier probably has a value of around 2.0. Its size also depends on how long ago the spending increase began. For example, in the first quarter of an increase in government spending, the multiplier is only about 1.1. If government spending rises by $1 billion, GDP will increase by about $1.1 billion during the first quarter. In the second quarter, the multiplier will rise to about 1.6. The multiplier then will rise to its peak of about 2.0 in the fourth quarter.

One of the main points to remember here is that if the government is contemplating a monetary or fiscal policy change, the response of the economy to the change is not likely to be large and quick. It takes time for the full effects to be felt, and in the final analysis, the effects are much smaller than the simple multiplier we discussed in Chapter 23 would lead one to believe.

A good way to review much of the material since Chapter 23 is to make sure you clearly understand how the value of the multiplier is affected by each of the additions to the simple model in Chapter 23. We have come a long way since then, and this review may help you to put all the pieces together.
During times of unemployment, households’ labor supply can be constrained. Households may want to work a certain number of hours at current wage rates but may not be allowed to do so by firms. In this case, the level of income (at least workers’ income) depends exclusively on the employment decisions made by firms. Households consume less if they are constrained from working.

The government influences household behavior mainly through income tax rates and transfer payments. If the substitution effect dominates, an increase in tax rates lowers after-tax income, decreases consumption, and decreases the labor supply; a decrease in tax rates raises after-tax income, increases consumption, and increases labor supply. Increases in transfer payments increase consumption and decrease labor supply; decreases in transfer payments decrease consumption and increase labor supply.

During times of unemployment, households’ labor supply may be constrained. Households may want to work a certain number of hours at current wage rates but may not be allowed to do so by firms. In this case, the level of income (at least workers’ income) depends exclusively on the employment decisions made by firms. Households consume less if they are constrained from working.
THE SIZE OF THE MULTIPLIER p. 631

20. There are several reasons why the actual value of the multiplier is smaller than the size that would be expected from the simple multiplier model: (1) Automatic stabilizers help to offset contractions or limit expansions. (2) When government spending increases, the increased interest rate crowds out planned investment and consumption spending. (3) Expansionary policies increase the price level. (4) Firms sometimes hold excess capital and excess labor. (5) Firms may meet increased demand by drawing down inventories instead of increasing output. (6) Households and firms change their behavior less when they expect changes to be temporary instead of permanent.

21. In practice, the size of the multiplier at its peak is about 2.

REVIEW TERMS AND CONCEPTS

accelerator effect, p. 625
adjustment costs, p. 625
animal spirits of entrepreneurs, p. 624
constrained supply of labor, p. 620
desired, or optimal, level of inventories, p. 626
discouraged-worker effect, p. 630
excess capital, p. 625
excess labor, p. 625
inventory investment, p. 625
life-cycle theory of consumption, p. 616
nominal wage rate, p. 618
nonlabor, or nonwage, income, p. 619
Okun’s Law, p. 630
permanent income, p. 616
productivity, or labor productivity, p. 629
real wage rate, p. 618
unconstrained supply of labor, p. 620

PROBLEMS

1. Between October 2004 and October 2005, real GDP in the United States increased by 3.6 percent, while nonfarm payroll jobs increased by only 1.4 percent. How is it possible for output to increase without a proportional increase in the number of workers?

2. [Related to the Economics in Practice on p. 622] Suppose that for your 21st birthday, your family decides to surprise you with a weekend trip to Las Vegas. Although you are a full-time college student and therefore do not have a large amount of money to spend on gambling, your excitement gets the best of you as you put $100 in a dollar slot machine. On your third pull of the handle, you win a jackpot which pays you $50,000 after all taxes have been taken out. Explain how the simple Keynesian model and the life-cycle theory differ with respect to how this $50,000 jackpot might influence your consumption. How might your answer change if instead of $50,000, your slot jackpot paid you $1 million?

3. During 2005, the Federal Reserve Bank raised interest rates in an effort to prevent an increase in the rate of inflation.
   a. What direct effects do higher interest rates have on household and firm behavior?
   b. One of the consequences of higher interest rates was that the value of existing bonds (both corporate bonds and government bonds) fell substantially. Explain why higher interest rates would decrease the value of existing fixed-rate bonds held by the public.
   c. Some economists argue that the wealth effect of higher interest rates on consumption is as important as the direct effect of higher interest rates on investment. Explain what economists mean by “wealth effects on consumption” and illustrate with AS/AD curves.

4. In 2005, President Bush’s tax reform commission proposed and Congress enacted a decrease in taxes. One of the cuts was in the income tax rate for higher-income wage earners. Republicans claimed that raising the rewards for working (the net after-tax wage rate) would lead to more work effort and a higher labor supply. Critics of the tax cuts replied that this criticism was baseless because it “ignored the income effect of the tax cut (net wage increase).” Explain what these critics meant.

5. Graph the following two consumption functions:
   \[C = 300 + .5Y\]
   \[C = .5Y\]
   a. For each function, calculate and graph the average propensity to consume (APC) when income is $100, $400, and $800.
   b. For each function, what happens to the APC as income rises?
   c. For each function, what is the relationship between the APC and the marginal propensity to consume?
   d. Under the first consumption function, a family with income of $50,000 consumes a smaller proportion of its income than a family with income of $20,000; yet if we take a dollar of income away from the rich family and give it to the poor family, total consumption by the two families does not change. Explain how this is possible.

6. Throughout the late 1990s, the price of houses increased steadily around the country.
   a. What impact would you expect increases and decreases in home value to have on the consumption behavior of home owners? Explain.
   b. In what ways might events in the housing market have influenced the rest of the economy through their effects on consumption spending? Be specific.
Adam Smith is 45 years old. He has assets (wealth) of $20,000 and has no debts or liabilities. He knows that he will work for 20 more years and will live 5 years after that, when he will earn nothing. His salary each year for the rest of his working career is $14,000. (There are no taxes.) He wants to distribute his consumption over the rest of his life in such a way that he consumes the same amount each year. He cannot consume in total more than his current wealth plus the sum of his income for the next 20 years. Assume that the rate of interest is zero and that Smith decides not to leave any inheritance to his children.

a. How much will Adam consume this year and next year? How did you arrive at your answer?

b. Plot on a graph Adam’s income, consumption, and wealth from the time he is 45 until he is 70 years old. What is the relationship between the annual increase in his wealth and his annual saving (income minus consumption)? In what year does Adam’s wealth start to decline? Why? How much wealth does he have when he dies?

c. Suppose Adam receives a tax rebate of $100 per year, so his income is $14,100 per year for the rest of his working career. By how much does his consumption increase this year and next year?

d. Now suppose Adam receives a 1-year-only tax refund of $100—his income this year is $14,100; but in all succeeding years, his income is $14,000. What happens to his consumption this year? in succeeding years?

8. Explain why a household’s consumption and labor supply decisions are interdependent. What impact does this interdependence have on the way in which consumption and income are related?

9. Why do expectations play such an important role in investment demand? How, if at all, does this explain why investment is so volatile?

10. How can a firm maintain a smooth production schedule even when sales are fluctuating? What are the benefits of a smooth production schedule? What are the costs?

11. Explain the effect that each of the following situations will have on the size of the multiplier.
   a. Firms have excess inventories as the economy begins to recover from a recession.
   b. Expansionary policy causes the price level to increase.
   c. People expect a $500 tax rebate to be a one-time occurrence.
   d. The government decreases spending, and the Fed does not change the money supply.
   e. The economy expands, and income taxes are progressive.
   f. The government extends unemployment benefits as a response to a lingering recession.

12. The Bureau of Labor Statistics reported that in June 2010, the unemployment rate in the United States was 9.5 percent. In November 2007, prior to the beginning of the recession of 2007–2009, the BLS reported an unemployment rate of 4.7 percent.
   a. According to Okun’s Law, by how much would GDP need to increase for the unemployment rate to decrease from the June 2010 rate back to the pre-recession rate of November 2007?
   b. In June 2010, the annual GDP growth rate in the United States was 2.4 percent. At this rate of growth, how long does Okun’s Law predict it would take for the economy to return to the unemployment rate of November 2007?

13. In the short run, the percentage increase in output tends to correspond to a smaller percentage decrease in the unemployment rate due to “slippages.” Explain the three slippages between changes in output and changes in the unemployment rate.

14. George Jetson has recently been promoted to inventory control manager at Spacely Sprockets, and he must decide on the optimal level of sprockets to keep in inventory. How should Jetson decide on the optimal level of inventory? How would a change in interest rates affect the optimal level of inventory? What costs and benefits will Spacely Sprockets experience by holding inventory?

15. Futurama Medical is a high-tech medical equipment manufacturer that uses custom-designed machinery and a highly skilled, well-trained labor force in its production factory. Gonzo Garments is a mid-level clothing manufacturer that uses mass-produced machinery and readily available labor in its production factory. Which of these two firms would you expect to have more significant adjustment costs? Which firm would be more likely to hold excess labor? excess capital? Explain your answers.

* Note: Problems marked with an asterisk are more challenging.
Long-Run Growth

Think about how many hours your grandparents had to work to pay for basic necessities like food and clothing. Now think about how many hours you will have to work for the same thing. You will likely spend many fewer hours. People on average will earn in real terms more per hour than did people of earlier generations. This is true in almost all economies, but certainly in all developed economies. Another way of saying this is that in almost all economies the amount of output produced per worker has risen over time. Why? Why are we able to produce more per hour than prior generations did? This is the subject matter of this chapter. We explore the long-run growth process.

We briefly introduced long-run growth in Chapter 22. We distinguished between output growth, which is the growth rate of output of the entire economy, and per-capita output growth, which is the growth rate of output per person in the economy. Another important concept, as mentioned in the previous paragraph, is the growth of output per worker, called labor productivity growth. Output per capita is a measure of the standard of living in a country. It is not the same as output per worker because not everyone in the population works. Output per capita can fall even when output per worker is increasing if the fraction of the population that is working is falling (as it might be in a country with an increasing number of children per working-age adult). Output per capita is a useful measure because it tells us how much output each person would receive if total output were evenly divided across the entire population. Output per worker is a useful measure because it tells us how much output each worker on average is producing.

We begin this chapter with a brief history of economic growth since the Industrial Revolution. We then discuss the sources of growth—answering the question why output per worker has risen over time. We then turn to look more narrowly at the U.S. growth picture. We conclude with a discussion of growth and the environment, returning to the world perspective.
The Growth Process: From Agriculture to Industry

The easiest way to understand the growth process and to identify its causes is to think about a simple economy. Recall from Chapter 2, Colleen and Bill washed up on a deserted island. At first, they had only a few simple tools and whatever human capital they brought with them to the island. They gathered nuts and berries and built a small cabin. Their “GDP” consisted of basic food and shelter.

Over time, things improved. The first year they cleared some land and began to cultivate a few vegetables they found growing on the island. They made some tools and dug a small reservoir to store rainwater. As their agricultural efforts became more efficient, they shifted their resources—their time—into building a larger, more comfortable home.

Colleen and Bill were accumulating capital in two forms. First, they built physical capital, material things used in the production of goods and services—a better house, tools, a water system, perhaps a boat to let them fish farther off shore. Second, they acquired more human capital—knowledge, skills, and talents. Through trial and error, they learned about the island and its soil and its climate and learned what did and did not work. Both kinds of capital made them more efficient and increased their productivity. Because it took less time to produce the food they needed to survive, they could devote more energy to producing other things or to leisure.

At any given time, Colleen and Bill faced limits on what they could produce. These limits were imposed by the existing state of their technical knowledge and the resources at their disposal. Over time, they expanded their possibilities, developed new technologies, accumulated capital, and made their labor more productive. In Chapter 2, we defined a society’s production possibility frontier (ppf), which shows all possible combinations of output that can be produced given present technology and whether all available resources are fully and efficiently employed. Economic growth expands those limits and shifts society’s production possibilities frontier out to the right, as Figure 32.1 shows.

Before the Industrial Revolution in Great Britain, every society in the world was agrarian. Towns and cities existed here and there, but almost everyone lived in rural areas. People spent most of their time producing food and other basic subsistence goods. Then beginning in England around 1750, technical change and capital accumulation increased productivity significantly in two important industries: agriculture and textiles. New and more efficient methods of farming were developed. New inventions and new machinery in spinning and weaving meant that more could be produced with fewer resources. Just as new technology, capital equipment, and resulting higher productivity made it possible for Colleen and Bill to spend time working on other projects and new “products,” the British turned from agricultural production to industrial production. In both cases, growth meant new products, more output, and wider choice.

Those changes meant that peasants and workers in eighteenth-century England who in the past would have continued in subsistence farming could make a better living as urban workers. A rural agrarian society was very quickly transformed into an urban industrial society.

> FIGURE 32.1
Economic Growth Shifts Society’s Production Possibility Frontier Up and to the Right
The production possibility frontier shows all the combinations of output that can be produced if all society’s scarce resources are fully and efficiently employed. Economic growth expands society’s production possibilities, shifting the ppf up and to the right.
The transition from agriculture to industry has been more recent in developing countries in Asia. One of the hallmarks of current growth in China and Vietnam, for example, has been the focus on manufacturing exports as a growth strategy. A visitor to Vietnam cannot help but be struck by the pace of industrialization.

Economic growth continues today in the developed world. And while the underlying process is still the same, the face is different. Just as Colleen and Bill devoted time to building a boat and designing tools, the developed economies are still creating capital to increase productivity. Just as a shovel makes it possible to dig a bigger hole, new microwave towers bring cell phone service to places that had been out of range. Scientists work on finding a cure for Alzheimer’s disease using tools they couldn’t have dreamed of a decade ago. Tools available on the Web make it possible for a single law clerk in a busy law office to check hundreds of documents for the opinions of potential expert witnesses in a court case in an hour, a task that took a dozen law clerks weeks to perform just a few years ago. In each case, we have become more proficient at producing what we want and need and we have freed up resources to produce new things that we want and need. For Colleen and Bill, it was a better diet; with a boat, they could catch more fish in less time. Today it may be better cell phone service, a fast, inexpensive color printer, or a better medical procedure.

The basic building blocks are the same. Growth comes from a bigger workforce and more productive workers. Higher productivity comes from tools (capital), a better-educated and more highly skilled workforce (human capital), and increasingly from innovation and technical change (new techniques of production) and newly developed products and services.

Table 32.1 provides estimates of the growth of GDP for a number of developed and developing countries for the 17 years 1991–2007. One fact that should strike you as you look at these numbers is the high rates of growth of China and India relative to those of the developed countries. Some economists argue that when poorer, less developed countries begin to develop, they typically have higher growth rates as they catch-up with the more developed countries. This idea is called convergence theory since it suggests that gaps in national incomes tend to close over time. Indeed, more than 50 years ago, the economic historian Alexander Gerschenkron coined the term the advantages of backwardness as a description of the phenomenon by which less developed countries could leap ahead by borrowing technology from more developed countries. This idea seems to fit the current experiences of China and India, as shown in the table. On the other hand, growth rates in Africa are more modest, although still higher than those for the developed countries. We turn now to look at the sources of economic growth.

### Table 32.1 Growth of Real GDP: 1991–2007

<table>
<thead>
<tr>
<th>Country</th>
<th>Average Growth Rates per Year, percentage points, 1991–2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>3.0</td>
</tr>
<tr>
<td>Japan</td>
<td>1.3</td>
</tr>
<tr>
<td>Germany</td>
<td>1.7</td>
</tr>
<tr>
<td>France</td>
<td>1.9</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>2.5</td>
</tr>
<tr>
<td>China</td>
<td>10.4</td>
</tr>
<tr>
<td>India</td>
<td>6.3</td>
</tr>
<tr>
<td>Africa</td>
<td>3.8</td>
</tr>
</tbody>
</table>

*Source: Economic Report of the President, 2010, Table B-112*

### Sources of Economic Growth

It will be useful to begin with a simple case where the quality of labor, $L$, and the quality of capital, $K$, do not change over time. A worker is a worker is a worker, and a machine is a machine is a machine. Output, $Y$, is produced in a production process using $L$ and $K$. In most situations it seems reasonable to assume that as labor and capital increase, so will output. The exact relationship between these inputs and output can be described with an aggregate production function, which is a mathematical relationship stating that total GDP (output) ($Y$) depends on the total amount of labor used ($L$) and the total amount of capital ($K$) used. (Land is another possible input in the production process, but we are assuming that land is fixed.) The numbers that are used in Tables 32.2 and 32.4, which follow, are based on the simple production function $Y = 3 \times K^{1/3}L^{2/3}$. Both

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**catch-up** The theory stating that the growth rates of less developed countries will exceed the growth rates of developed countries, allowing the less developed countries to catch up.
capital and labor are needed for production (if either is equal to zero, so is output) and increases in either result in more output. Using this construct we can now explore exactly how an economy achieves higher output levels over time as it experiences changes in labor and capital.

Increase in Labor Supply

In our example of Colleen and Bill on an island, it is clear that adding another individual exactly like Colleen and Bill to the workforce would increase output. A key question is how large the increase would be? In fact, both economic theory and practice tell us that in the absence of increases in the capital stock, as labor increases, less and less output will be added by each new worker. This effect is called diminishing returns. It has been discussed for well over a hundred years, beginning with early economists like Thomas Malthus and David Ricardo who began thinking about the effects of population growth.

Malthus and Ricardo focused on agricultural output for which the central form of capital was land. With land in limited supply, the economists reckoned that new farm laborers would be forced to work the land more intensively or to bring less productive land into the agricultural sector. In either case, as labor supply grew, output would increase, but at a declining rate. Increases in the labor supply would reduce labor productivity, or output per worker.

In developed economies, labor works not so much with land as with other forms of capital—machines, computers, and the like. But diminishing returns occur in this setting as well. Table 32.2 provides an arithmetic example of diminishing returns using the aggregate production function discussed previously. Notice in the table the relationship between the level of output and the level of labor. With capital fixed at 100, as labor increases from 100 to eventually 130, total output increases, but at a diminishing rate. In the last column, we see that labor productivity falls. Simply increasing the amount of labor with no other changes in the economy decreases labor productivity because of diminishing returns.

**TABLE 32.2  Economic Growth from an Increase in Labor—More Output but Diminishing Returns and Lower Labor Productivity**

<table>
<thead>
<tr>
<th>Period</th>
<th>Quantity of Labor $L$ (Millions)</th>
<th>Quantity of Capital $K$ (Millions)</th>
<th>Total Output $Y$ (Millions)</th>
<th>Labor Productivity $Y/L$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100</td>
<td>100</td>
<td>300</td>
<td>3.0</td>
</tr>
<tr>
<td>2</td>
<td>110</td>
<td>100</td>
<td>320</td>
<td>2.9</td>
</tr>
<tr>
<td>3</td>
<td>120</td>
<td>100</td>
<td>339</td>
<td>2.8</td>
</tr>
<tr>
<td>4</td>
<td>130</td>
<td>100</td>
<td>357</td>
<td>2.7</td>
</tr>
</tbody>
</table>

The U.S. population and labor force have grown over time. Table 32.3 shows the growth of the population, labor force, and employment between 1960 and 2008. In this period, the population 16 and over grew at an annual rate of 1.4 percent, the labor force grew at an annual rate of 1.6 percent, and employment grew at an annual rate of 1.6 percent. We will come back to this table later in the chapter. We would expect that this increase in labor would, by itself, end up increasing overall output levels in the United States.


<table>
<thead>
<tr>
<th>Civilian Noninstitutional Population 16 and Over (Millions)</th>
<th>Civilian Labor Force</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number (Millions)</td>
</tr>
<tr>
<td></td>
<td>Percentage of Population</td>
</tr>
<tr>
<td>1960</td>
<td>117.3</td>
</tr>
<tr>
<td>1970</td>
<td>137.1</td>
</tr>
<tr>
<td>1980</td>
<td>167.7</td>
</tr>
<tr>
<td>1990</td>
<td>189.2</td>
</tr>
<tr>
<td>2000</td>
<td>212.6</td>
</tr>
<tr>
<td>2008</td>
<td>233.8</td>
</tr>
<tr>
<td>Percentage change, 1960–2008</td>
<td>+99.3%</td>
</tr>
<tr>
<td>Annual rate</td>
<td>+1.4%</td>
</tr>
</tbody>
</table>

Increase in Physical Capital

It is easy to see how physical capital contributes to output. Bill and Colleen digging a garden with one shovel will be able to do more if a second shovel is added. How much more? We saw that there are diminishing returns to labor as more and more labor is added to a fixed amount of capital. There are likewise diminishing returns to capital as more and more capital is added to a fixed supply of labor. The extra output from the garden that Bill and Colleen can produce when a second shovel is added is likely to be smaller than the extra output that was produced when the first shovel was added. If a third shovel were added, even less extra output would likely be produced (if any).

Table 32.4 shows how an increase in capital without a corresponding increase in labor increases output. It uses the same aggregate production function employed in Table 32.2. Observe two things about these numbers. First, additional capital increases labor productivity—it rises from 3.0 to 3.3 as capital is added. Second, there are diminishing returns to capital. Increasing capital by 10 first increases output by 10—from 300 to 310. However, the second increase of 10 yields only an output increase of 9, and the third increase of 10 yields only an output increase of 8. The last column in the table shows the decline in output per capital as capital is increased.

<table>
<thead>
<tr>
<th>Period</th>
<th>Quantity of Labor L</th>
<th>Quantity of Capital K</th>
<th>Total Output Y</th>
<th>Labor Productivity Y/L</th>
<th>Output per Capital Y/K</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100</td>
<td>100</td>
<td>300</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
<td>110</td>
<td>310</td>
<td>3.1</td>
<td>2.8</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>120</td>
<td>319</td>
<td>3.2</td>
<td>2.7</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
<td>130</td>
<td>327</td>
<td>3.3</td>
<td>2.5</td>
</tr>
</tbody>
</table>

The U.S. capital stock has grown over time, also contributing to output growth. Table 32.5 shows the growth of capital equipment and capital structures between 1960 and 2008. (The increase in the capital stock is the difference between gross investment and depreciation. Remember that some capital becomes obsolete and some wears out each year.) Between 1960 and 2008 the stock of equipment grew at an annual rate of 4.4 percent and the stock of structures grew at an annual rate of 2.4 percent.

<table>
<thead>
<tr>
<th>Year</th>
<th>Equipment</th>
<th>Structures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>666.8</td>
<td>2,860.1</td>
</tr>
<tr>
<td>1970</td>
<td>1,146.8</td>
<td>3,951.8</td>
</tr>
<tr>
<td>1980</td>
<td>1,919.6</td>
<td>5,216.8</td>
</tr>
<tr>
<td>1990</td>
<td>2,603.8</td>
<td>6,908.4</td>
</tr>
<tr>
<td>2000</td>
<td>4,204.1</td>
<td>8,162.1</td>
</tr>
<tr>
<td>2008</td>
<td>5,400.0</td>
<td>9,266.5</td>
</tr>
</tbody>
</table>

Percentage change, 1960–2008: +709.8% for equipment and +224.0% for structures. Annual rate: +4.4% for equipment and +2.4% for structures.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, and authors’ estimates.

Notice the growth rates of capital in Table 32.5 (4.4 percent and 2.4 percent) are larger than the growth rate of labor in Table 32.3 (1.6 percent). Capital has grown relative to labor in the United States. As a result, each U.S. worker has more capital to work with now than he or she had a hundred years ago. We see in Table 32.4 that adding more capital relative to labor increases labor productivity. We thus have one answer so far as to why labor productivity has grown over time in the United States—the amount of capital per worker has grown. You are able to produce more output per hour than your grandparents did because you have more capital to work with. In almost all economies, capital has been growing faster than labor, which is an important source of labor productivity growth in these economies.
The importance of capital in a country’s economic growth naturally leads one to ask the question of what determines a country’s stock of capital. In the modern open economy, new capital can come from the saving of a country’s residents and/or from the investments of foreigners. Foreign direct investment is any investment in enterprises made in a country by residents outside that country. Foreign direct investment has been quite influential in providing needed capital for growth in much of Southeast Asia. In Vietnam, for example, rapid growth has been led by foreign direct investment. Very recently, we have seen signs of Chinese foreign direct investment in parts of Africa and in other parts of Asia.

Recent work in economics has focused on the role that institutions play in creating a capital-friendly environment that encourages home savings and foreign investment. In a series of papers, LaPorta, Lopez de Silanes, Shleifer, and Vishny argue that countries with English common law origins (as opposed to French) provide the strongest protection for shareholders, less corrupt governments, and better court systems. In turn, these financial and legal institutions promote growth by encouraging capital investment. Countries with poor institutions, corruption, and inadequate protection for lenders and investors struggle to attract capital. The World Bank calls countries with weak institutions fragile countries.

Many of the World Bank’s fragile countries are in sub-Saharan Africa. Many observers believe that the relative stagnation of some of the sub-Saharan African nations comes in part from their relatively weak institutions. High costs of doing business, including corruption and investment risks associated with conflict, have made countries such as Zimbabwe less attractive to domestic and foreign capital. Ethnic and linguistic fractionalization have also played a role. In the United States case growth has been facilitated by the use of foreign capital, much of which was attracted by strong institutions.

Increase in the Quality of the Labor Supply (Human Capital)

So far we have looked at what happens when an economy gets more units of identical workers. But as we well know, in most societies, populations have grown more educated and healthier over time. The quality of labor has changed, as well as its quantity, and this too leads to long-run growth.

When the quality of labor increases, this is referred to as an increase in human capital. If a worker’s human capital has increased, he or she can produce more output working with the same amount of physical capital. Labor input in efficiency terms has increased.

Human capital can be produced in many ways. Individuals can invest in themselves by going to college or by completing vocational training programs. Firms can invest in human capital through on-the-job training. The government invests in human capital with programs that improve health and that provide schooling and job training.

In the developing countries of sub-Saharan Africa, health is a major issue due to the high incidence of HIV and other diseases. Programs to improve the health of the population increase, among other things, the quality of the labor force, which increases output. Workers who are ill are obviously less productive than those who are not.

In the United States, considerable resources have been put into education over the decades. Table 32.6 shows that the level of educational attainment in the United States has risen significantly.

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage with Less than 5 Years of School</th>
<th>Percentage with 4 Years of High School or More</th>
<th>Percentage with 4 Years of College or More</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940</td>
<td>13.7</td>
<td>24.5</td>
<td>4.6</td>
</tr>
<tr>
<td>1950</td>
<td>11.1</td>
<td>34.3</td>
<td>6.2</td>
</tr>
<tr>
<td>1960</td>
<td>8.3</td>
<td>41.1</td>
<td>7.7</td>
</tr>
<tr>
<td>1970</td>
<td>5.5</td>
<td>52.3</td>
<td>10.7</td>
</tr>
<tr>
<td>1980</td>
<td>3.6</td>
<td>66.5</td>
<td>16.2</td>
</tr>
<tr>
<td>1990</td>
<td>NA</td>
<td>77.6</td>
<td>21.3</td>
</tr>
<tr>
<td>2000</td>
<td>NA</td>
<td>84.1</td>
<td>25.6</td>
</tr>
<tr>
<td>2008</td>
<td>NA</td>
<td>86.6</td>
<td>29.4</td>
</tr>
</tbody>
</table>

NA = not available.

Source: Statistical Abstract of the United States, 1990, Table 215, and 2010, Table 224.
Education and Skills in the United Kingdom

In discussions of using education and health care to boost labor productivity, the context is often the developing economies, where the overall level of health and education are low. But as the article below suggests, developed economies like the United Kingdom are also concerned about the skill level of their labor force as they contemplate their productivity and growth rates.

**U.K. Businesses Press for Focus on Skills**

*The Wall Street Journal*

The U.K. has for many years been among the world’s top attractors of foreign investment, but was hit hard during the financial and economic crisis. Foreign direct investment halved in 2009 from a year earlier, according to data from the United Nations Conference on Trade and Development.

“The emerging markets are now able to do everything, and are in fact surpassing us in some of their innovation and so on. That makes the competition for U.K. businesses in particular even more severe,” Institute of Directors Director-General Miles Templeman said.

Boosting medium- and long-term competitiveness, which requires a big improvement in education and skills, should be a key electoral issue, but hasn’t really been addressed at all, he said. “Quite frankly, the degree of business orientation in most of the policies has not been very strong—not in the sense of really facing up to this international competition,” he said.

While the Labour government has invested heavily in education over the 13 years it’s been in power, businesses in the U.K. frequently complain that many jobseekers lack basic skills.

Government data show that in 2009, 70% of British 16-year-olds managed to gain five or more GCSE qualifications of at least a grade C, broadly regarded as a pass, up 4.7 percentage points from a year earlier. But that still meant that 30% of pupils reaching school-leaving age did not achieve this basic benchmark.

“A significant part of the productivity gap with our competitors comes down to our relatively poor skills base,” said Richard Wainer, head of education and skills at the Confederation of British Industry, or CBI, a major business group. “There is still a job to do to raise our game on skills generally, particularly at an intermediate and higher level.”


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since 1940. The percentage of the population with at least 4 years of college rose from 4.6 percent in 1940 to 29.4 percent in 2008. In 1940 less than one person in four had completed high school; in 2008 86.6 percent had. This is a substantial increase in human capital. We thus have our second answer as to why labor productivity has increased in the United States—the quality of labor has increased through more education. As we see in the Economics in Practice above, policy makers in many developed economies are concerned about their ability to continue to generate growth through human capital improvements.

**Increase in the Quality of Capital (Embodied Technical Change)**

Just as workers have changed in the last one hundred years, so have machines. A present-day word processor is quite different from the manual typewriter of the early 20th century. An increase in the quality of a machine will increase output in the production process for the same amount of labor used. How does an increase in the quality of capital come about? It comes about in what we will call **embodied technical change**. Some technical innovation takes place, such as a faster computer chip, which is then incorporated into machines. Usually the technical innovations are incorporated into new machines, with older machines simply discarded when they become obsolete. In this case the quality of the total capital stock increases over time as more efficient new machines replace less efficient old ones. In some cases, however, innovations are incorporated into old machines. Commercial airplanes last for many decades, and many innovations that affect airplanes are incorporated into existing ones. But in general, one thinks of embodied technical change as showing up in new machines rather than existing ones.
An increase in the quality of capital increases labor productivity (more output for the same amount of labor). We thus have our third answer as to why labor productivity has increased over time—the quality of capital has increased because of embodied technical change.

We will come back to embodied technical change, but to finish the train of thought we turn next to disembodied technical change.

**Disembodied Technical Change**

In some situations we can achieve higher levels of output over time even if the quantity and quality of labor and capital don’t change. How might we do this? Perhaps we learn how to better organize the plant floor or manage the labor force. In recent years operational improvements like lean manufacturing and vendor inventory management systems have increased the ability of many manufacturing firms to get more output from a fixed amount and quality of labor and capital. Even improvements in information and accounting systems or incentive systems can lead to improved output levels. A type of technical change that is not specifically embedded in either labor or capital but works instead to allow us to get more out of both is called disembodied technical change.

Recent experiences in the Chinese economy provide an interesting example of what might be considered disembodied technical change broadly defined. Working at the IMF, Zuliu Hu and Mohsin Khan have pointed to the large role of productivity gains in the 20 years following the market reforms in China. In the period after the reforms, productivity growth rates tripled, averaging almost 4 percent a year. Hu and Khan argue that the productivity gains came principally from the unleashing of profit incentives that came with opening business to the private sector. Better incentives produced better use of labor and capital.

Disembodied technical change can be negative. An example is environmental regulations that require the whole production process to pollute less and thus, run less efficiently from a private perspective. Another example is health and safety regulations that require the production process to run slower to reduce injuries to workers. There is an important caveat here, however. In these examples, output will be smaller if it does not include the increased quality of air, water, health, and safety that results from the regulations. So you can think about disembodied technical change in these cases as being negative regarding the usual measure of output, but not necessarily a broader measure of welfare.

To the extent that disembodied technical changes are mostly positive, this is our fourth answer as to why labor productivity has increased. People have figured out how to run production processes and how to manage firms more efficiently.

**More on Technical Change**

We have seen that both embodied and disembodied technical change increase labor productivity. It is not always easy to decide whether a particular technical innovation is embodied or disembodied, and in many discussions this distinction is not made. In the rest of this section we will not make the distinction, but just talk in general about technical innovations. The main point to keep in mind is that technical change, regardless of how it is categorized, increases labor productivity.

The Industrial Revolution was in part sparked by new technological developments. New techniques of spinning and weaving—the invention of the machines known as the mule and the spinning jenny, for example—were critical. The high-tech boom that swept the United States in the early 1980s was driven by the rapid development and dissemination of semiconductor technology. The high-tech boom in the 1990s was driven by the rise of the Internet and the technology associated with it. In India in the 1960s, new high-yielding seeds helped to create a “green revolution” in agriculture.

Technical change generally takes place in two stages. First, there is an advance in knowledge, or an invention. However, knowledge by itself does nothing unless it is used. When new knowledge is used to produce a new product or to produce an existing product more efficiently, there is innovation. Given the centrality of innovation to growth, it is interesting to look at what has been happening to research in the United States over time. A commonly used measure of inputs into research is the fraction of GDP spent. In 2007, the United States spent 2.6 percent of GDP on R&D, down from a high of 2.9 percent in the early 1960s. Moreover, over time, the balance of research funding has shifted away from government toward industry. Since industry research tends to be more applied, some observers are concerned that the United States will lose some of its edge in technology unless more funding is provided. In 2007, the National Academies of Science argued as follows:

Although many people assume that the United States will always be a world leader in science and technology, this may not continue to be the case inasmuch as great minds
and ideas exist throughout the world. We fear the abruptness with which a lead in science and technology can be lost—and the difficulty of recovering a lead once lost, if indeed it can be recovered at all.\(^1\)

As we suggested earlier, the theory of convergence suggests that newly developing countries can leap forward by exploiting the technology of the developed countries. Indeed, all countries benefit when a better way of doing things is discovered. Innovation and the diffusion of that innovation push the production possibility frontier outward. But there is at least some evidence that a country that leads in a discovery retains some advantage in exploiting it, at least for some time.

What evidence do we have that the United States might be losing its edge? As a share of GDP, the United States ranked seventh among OECD countries in 2006. If we look at patenting data, the evidence is more encouraging: For patents simultaneously sought in the United States, Japan, and the European Union (EU), known as triadic patents, U.S. inventors are the leading source, having taken the lead from the EU in 1989. On the output side, then, the United States appears still to be quite strong.

**U.S. Labor Productivity: 1952 I–2010 I**

Now that we have considered the various answers as to why U.S. labor productivity has increased over time, we can return to the data and see what the actual growth has been. In Figure 22.2 on p. 453, we presented a plot of U.S. labor productivity for the 1952 I–2010 I period. This figure is repeated in Figure 32.2 below. Remember that the line segments are drawn to smooth out the short-run fluctuations in productivity. We saw in the last chapter that as productivity is measured, it moves with the business cycle because firms tend to hold excess labor in recessions. We are not interested in business cycles in this chapter, and the line segments are a way of ignoring business cycle effects.

There was much talk in the late 1970s and early 1980s about the U.S. “productivity problem.” Some economics textbooks published in the early 1980s had entire chapters discussing the decline in productivity that seemed to be taking place during the late 1970s. In January 1981, the Congressional Budget Office published a report, *The Productivity Problem: Alternatives for Action*.

It is clear from Figure 32.2 that there was a slowdown in productivity growth in the 1970s. The growth rate went from 3.1 percent in the 1950s and first half of the 1960s to 2.5 percent in the last half of the 1960s and early 1970s and then to 1.4 percent from the early 1970s to the 1990s. Many explanations were offered at the time for the productivity slowdown of the late 1970s and early 1980s. Some economists pointed to the low rate of saving in the United States compared with other parts of the world. Others blamed increased environmental

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and government regulation of U.S. business. Still others argued that the country was not spending as much on R&D as it should have been. Finally, some suggested that high energy costs in the 1970s led to investment designed to save energy instead of to enhance labor productivity.

Many of these factors turned around in the 1980s and 1990s and yet, as you can see from Figure 32.2, productivity growth rose to 2.0 percent in the 1990s and through 2010. This early discussion is now quite dated. The interesting question as we move into the second decade of the twenty-first century is whether the continued growth of the Internet and wireless devices will return productivity growth to the values observed in the 1950s and 1960s or whether the period of the 1950s and 1960s was simply an unusually good period for productivity growth and the United States will continue to have productivity growth of around 2 percent.

Growth and the Environment and Issues of Sustainability

In 2000, the United Nations unanimously adopted the Millennium Development Goals, a set of quantifiable, time-based targets for developing countries to meet. Included in these targets, as you might expect, were measures of education, mortality, and income growth. But the UN resolution also included a set of environmental criteria. Specific criteria have been developed around clean air, clean water, and conservation management. Table 32.10 provides the 2005 ranking of a series of developing countries on the UN index.

<table>
<thead>
<tr>
<th>Environmental Scores in the World Bank Country Policy and Institutional Assessment 2005 Scores (min = 1, max = 6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albania</td>
</tr>
<tr>
<td>Angola</td>
</tr>
<tr>
<td>Bhutan</td>
</tr>
<tr>
<td>Cambodia</td>
</tr>
<tr>
<td>Cameroon</td>
</tr>
<tr>
<td>Gambia</td>
</tr>
<tr>
<td>Haiti</td>
</tr>
<tr>
<td>Madagascar</td>
</tr>
<tr>
<td>Mozambique</td>
</tr>
<tr>
<td>Papua New Guinea</td>
</tr>
<tr>
<td>Sierra Leone</td>
</tr>
<tr>
<td>Sudan</td>
</tr>
<tr>
<td>Tajikistan</td>
</tr>
<tr>
<td>Uganda</td>
</tr>
<tr>
<td>Vietnam</td>
</tr>
<tr>
<td>Zimbabwe</td>
</tr>
</tbody>
</table>


The inclusion of environmental considerations in the development goals speaks to the importance of environmental infrastructure in the long-run growth prospects of a country. Environmental considerations also address some concerns that in the process of growth, environmental degradation will occur. Evidence on global warming has increased some of the international concerns about growth and the environment. The connections between the environment and growth are complex and remain debated among economists.

The classic work on growth and the environment was done in the mid-1990s by Gene Grossman and Alan Krueger.2 It is well known that as countries develop, they typically generate air and water pollutants. China’s recent rapid growth provides a strong example of this trend. Grossman and Krueger found, however, that as growth progresses and countries become richer, pollution tends to fall. The relationship between growth, as measured in per-capita income, and pollution is an inverted U. Figure 32.3 shows Grossman and Krueger’s evidence on one measure of air pollution.

How do we explain the inverted U? Clean water and clean air are what economists call normal goods. That is, as people get richer, they want to consume more of these goods. You have already seen in the Keynesian model that aggregate consumption increases with income. As it happens, microeconomics finds that this relationship is true for most individual types of goods as well. Demand for clean water and clean air turns out to increase with income levels. As countries develop, their populace increasingly demands improvements on these fronts. So while increased industrialization with growth initially degrades the environment, in the long run environmental quality improves.

Grossman and Krueger found this inverted U in a number of countries. Economic historians remind us that in the heyday of industrialization, northern England suffered from very serious air pollution. Some of you may recall the description of air pollution in nineteenth-century English novels such as Elizabeth Gaskell’s *North and South*.

If environmental pollution eventually declines as growth brings rising per-capita incomes, why should we be worried? First, as Grossman and Krueger point out, the inverted U represents historical experience, but it is not inevitable. In particular, if public opinion moves governments and the economy at large toward technologies that reduce pollution, this requires an empowered populace and a responsive government. Here too we see the importance of institutions in growth. A second issue arises in cases in which high levels of current emissions produce irreversible outcomes. Some would argue that by the time nations such as China and Vietnam develop enough to reduce their emissions, it will be too late. Many believe that global warming is such an example.

Another important problem that has made itself known recently comes from pollution sources that move across country boundaries. Carbon emissions associated with global warming are one such by-product of increased industrialization. Other air pollution problems move across national borders as well. In the heyday of industrialization by the Soviet Union, prevailing winds blew much of the Soviet-produced pollution to Finland. Choices that countries make about levels of growth and levels of environmental control affect the well-being of other countries’ populations. Nor is it easy for countries at very different levels of GDP per capita to agree on common standards of environmental control. As we suggested earlier, demand for clean air increases with income, when needs for food and shelter are better met. It should surprise no one who has studied economics that there are debates between developed countries and developing countries about optimal levels of environmental control. These debates are further complicated when we recognize the gains that consumers in developed economies reap from economic activity in the developing world. Much of the increased carbon emitted by Chinese businesses, for example, is associated with goods that are transported and traded to Europe and the United States. These consumers thus share the benefits of this air pollution through the cheaper goods they consume.

Much of Southeast Asia has fueled its growth through export-led manufacturing. For countries that have based their growth on resource extraction, there is another set of potential sustainability issues. Many of the African nations are in this category. Nigeria relies heavily on oil; South Africa and the Congo are large producers of diamonds and other gems. Extraction methods, of course, may carry environmental problems. Many people also question whether growth based on extraction is economically sustainable: What happens when the oil or minerals run out? The answer is quite complicated and depends in some measure on how the profits from the extraction process are used. Because extraction can be accomplished without a well-educated labor force, while other forms of development are more dependent on a skilled-labor base, public investment in infrastructure is especially important.
the extent that countries use the revenues from extraction to invest in infrastructure such as roads and schools and to increase the education and health of their populace, the basis for growth can be shifted over time. With weak institutions, these proceeds may be expropriated by corrupt governments or invested outside the country, and long-run sustainable growth will not result.

The question of whether the natural resource base imposes strong natural limits on growth has been debated since the time of Malthus. Earlier in this chapter we described the concerns of Thomas Malthus that population growth in England would outstrip the ability of the land to provide. In that case, technology stepped in.

In 1972, the Club of Rome, a group of “concerned citizens,” contracted with a group at MIT to do a study entitled The Limits to Growth.3 The book-length final report presented the results of computer simulations that assumed present growth rates of population, food, industrial output, and resource exhaustion. According to these data, sometime after the year 2000 the limits will be reached and the entire world economy will come crashing down:

Collapse occurs because of nonrenewable resource depletion. The industrial capital stock grows to a level that requires an enormous input of resources. In the very process of that growth, it depletes a large fraction of the resource reserves available. As resource prices rise and mines are depleted, more and more capital must be used for obtaining resources, leaving less to be invested for future growth. Finally, investment cannot keep up with depreciation and the industrial base collapses, taking with it the service and agricultural systems, which have become dependent on industrial inputs (such as fertilizers, pesticides, hospital laboratories, computers, and especially energy for mechanization)....Population finally decreases when the death rate is driven upward by the lack of food and health services.4

This argument is similar to one offered almost 200 years ago by Thomas Malthus, mentioned earlier in this chapter.

In the early 1970s, many thought that the Club of Rome’s predictions had come true. It seemed the world was starting to run up against the limits of world energy supplies. In the years since, new reserves have been found and new sources of energy have been discovered and developed. At present, issues of global warming and biodiversity are causing many people to question the process of growth. How should one trade off the obvious gains from growth in terms of the lives of those in the poorer nations against environmental goals? Recognizing the existence of these trade-offs and trying to design policies to deal with them is one of the key tasks of policy makers.

1. In almost all countries output per worker, labor productivity, has been growing overtime.

2. All societies face limits imposed by the resources and technologies available to them. Economic growth expands these limits and shifts society’s production possibilities frontier up and to the right.

3. There is considerable variation across the globe in growth rates. Some countries—particularly in Southeast Asia—appear to be catching up.

4. The process by which some less developed, poorer countries experience high growth and begin to catch up to more developed areas is known as convergence.

4 Meadows et al., pp. 131–132.
8. As countries begin to develop and industrialize, environmental problems are common. As development progresses further, however, most countries experience improvements in their environmental quality.

9. The limits placed on a country’s growth by its natural resources have been debated for several hundred years. Growth strategies based on extraction of resources may pose special challenges to a country’s growth.

**REVIEW TERMS AND CONCEPTS**

- aggregate production function, p. 637
- catch-up, p. 637
- disembodied technical change, p. 642
- embodied technical change, p. 641
- foreign direct investment (FDI), p. 640
- innovation, p. 642
- invention, p. 642
- labor productivity growth, p. 635
- output growth, p. 635
- per-capita output growth, p. 635

**PROBLEMS**

1. One way that less developed countries catch up with the growth of the more developed countries is by adopting the technology of the developed countries. On average, however, developed countries are capital-rich and labor-short relative to the developing nations. Think of the kinds of technology that a typical developing country with a short supply of capital and a large marginally employed labor force would find when “shopping” for technology in a more developed country. As a hint, the Japanese have developed the field of robotics such as assembly line machines. Such machines are designed to replace expensive workers with capital (robots) in order to lower the overall cost of production. In what ways does it help a developing country to transfer and use a new technology in its country? What are the costs?

2. Tables 1, 2, and 3 present some data on three hypothetical economies. Complete the tables by figuring the measured productivity of labor and the rate of output growth. What do the data tell you about the causes of economic growth? (Hint: How fast are L and K growing?)

**TABLE 1**

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>L</th>
<th>K</th>
<th>Y</th>
<th>Y/L</th>
<th>GROWTH RATE OF OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1,052</td>
<td>3,065</td>
<td>4,506</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1,105</td>
<td>3,095</td>
<td>4,674</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1,160</td>
<td>3,126</td>
<td>4,842</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1,218</td>
<td>3,157</td>
<td>5,019</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 2**

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>L</th>
<th>K</th>
<th>Y</th>
<th>Y/L</th>
<th>GROWTH RATE OF OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1,052</td>
<td>3,065</td>
<td>4,506</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1,062</td>
<td>3,371</td>
<td>4,683</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1,073</td>
<td>3,709</td>
<td>4,866</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1,084</td>
<td>4,079</td>
<td>5,055</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Go to a recent issue of *The Economist* magazine. In the back of each issue is a section called “economic indicators.” That section lists the most recent growth data for a substantial number of countries. Which countries around the world are growing most rapidly according to the most recent data? Which countries around the world are growing more slowly? Flip through the stories in *The Economist* to see if there is any explanation for the pattern that you observe. Write a brief essay on current general economic conditions around the world.

4. In the fall of 2005, the president’s tax reform commission issued a final report. The commission called for a general cut in marginal tax rates; lower tax rates on dividends, capital gains, and interest income; and, more importantly, the expensing of investment in capital equipment. These provisions were argued to be “pro-growth.” In what ways would you expect each of these proposals to be favorable to economic growth?

5. Education is an area in which it has been hard to create productivity gains that reduce costs. Collect data on the tuition rates of your own college in the last twenty years and compare that increase to the overall rate of inflation using the CPI. What do you observe? Can you suggest some productivity-enhancing measures?

6. Economists generally agree that high budget deficits today will reduce the growth rate of the economy in the future. Why? Do the reasons for the high budget deficit matter? In other words, does it matter whether the deficit is caused by lower taxes, increased defense spending, more job-training programs, and so on?
7. Why can growth lead to a more unequal distribution of income? By assuming this is true, how is it possible for the poor to benefit from economic growth?

8. According to the Bureau of Labor Statistics, productivity in the United States grew at an annual rate of 3.7 percent from 2008 to 2009. During this same time, real GDP in the United States declined by 2.5 percent. Explain how productivity can increase when real GDP is declining.


10. How do each of the following relate to the rates of productivity and growth in an economy?
   a. Spending on research and development
   b. Government regulation
   c. Changes in human capital
   d. Output per worker hour
   e. Embodied technological change
   f. Disembodied technological change

11. Use the data in the following table to explain what happened with respect to economic growth and the standard of living in each of the three countries.

12. [Related to the Economics in Practice on p. 641] A June 2010 article in Bloomberg Businessweek discussed government and business concerns of the economic impact of the decline in education on growth in the United States. Go to www.bls.gov and look up the current unemployment rate. Compare this to the current unemployment rates for those without a high school diploma, those with only a high school diploma, and those with a bachelor’s degree or higher. What does this data suggest about education requirements for jobs in the United States? Then go to www.census.gov and look at the current population survey historical table A-2. Find the percentage of the total population 25 years and older that have completed 4 years of high school or more and the percentage that have completed 4 years of college or more. Compare this data with the unemployment data. What does this information suggest about future productivity and growth for the U.S. economy?

All values are in 2005 U.S. dollars.
Source: United States Department of Agriculture.

Throughout this book, we have noted that there are many disagreements and questions in macroeconomics. For example, economists disagree on whether the aggregate supply curve is vertical, either in the short run or in the long run. Some economists even doubt that the aggregate supply curve is a useful macroeconomic concept. There are different views on whether cyclical employment exists and, if it does, what causes it. Economists disagree about whether monetary and fiscal policies are effective at stabilizing the economy, and they support different views on the primary determinants of consumption and investment spending.

We discussed some of these disagreements in previous chapters, but only briefly. In this chapter, we discuss in more detail a number of alternative views of how the macroeconomy works.

**Keynesian Economics**

John Maynard Keynes's *General Theory of Employment, Interest, and Money*, published in 1936, remains one of the most important works in economics. While a great deal of the material in the previous 10 chapters is drawn from modern research that postdates Keynes, much of the material is built around a framework constructed by Keynes.

What exactly is *Keynesian economics*? In one sense, it is the foundation of all of macroeconomics. Keynes was the first to emphasize aggregate demand and links between the money market and the goods market. Keynes also emphasized the possible problem of sticky wages. In recent years, the term *Keynesian* has been used more narrowly. Keynes believed in an activist federal government. He believed that the government had a role to play in fighting inflation and unemployment, and he believed that monetary and fiscal policy should be used to manage the macroeconomy. This is why *Keynesian* is sometimes used to refer to economists who advocate active government intervention in the macroeconomy.

During the 1970s and 1980s, it became clear that managing the macroeconomy was more easily accomplished on paper than in practice. The inflation problems of the 1970s and early 1980s and the seriousness of the recessions of 1974–1975 and 1980–1982 led many economists to challenge the idea of active government intervention in the economy. Some of the challenges were simple attacks on the bureaucracy’s ability to act in a timely manner. Others were theoretical assaults that claimed to show that monetary and fiscal policies had no or little effect on the economy.

We begin with an old debate—that between Keynesians and monetarists.
Monetarism

The debate between monetarist and Keynesian economics is complicated because it means different things to different people. If we consider the main monetarist message to be that “money matters,” then almost all economists would agree. In the aggregate supply/aggregate demand (AS/AD) story, for example, an increase in the money supply shifts the AD curve to the right, which leads to an increase in both aggregate output (Y) and the price level (P). Monetary policy thus has an effect on output and the price level. Monetarism, however, is usually considered to go beyond the notion that money matters.

The Velocity of Money

To understand monetarist reasoning, you must understand the velocity of money. Think of velocity as the number of times a dollar bill changes hands, on average, during a year.

Suppose on January 1 you buy a new ballpoint pen with a $5 bill. The owner of the stationery store does not spend your $5 right away. She may hold it until, say, May 1, when she uses it to buy a dozen doughnuts. The doughnut store owner does not spend the $5 he receives until July 1, when he uses it (along with other cash) to buy 100 gallons of oil. The oil distributor uses the bill to buy an engagement ring for his fiancée on September 1, but the $5 bill is not used again in the remaining 3 months of the year. Because this $5 bill has changed hands four times during the year, its velocity of circulation is 4. A velocity of 4 means that the $5 bill stays with each owner for an average of 3 months, or one quarter of a year.

In practice, we use gross domestic product (GDP), instead of the total value of all transactions in the economy, to measure velocity because GDP data are more readily available. The income velocity of money (V) is the ratio of nominal GDP to the stock of money (M):

\[ V = \frac{GDP}{M} \]

If $12 trillion worth of final goods and services is produced in a year and if the money stock is $1 trillion, then the velocity of money is $12 trillion ÷ $1 trillion, or 12.0.

We can expand this definition slightly by noting that nominal income (GDP) is equal to real output (income) (Y) times the overall price level (P):

\[ GDP = P \times Y \]

Through substitution:

\[ V = \frac{P \times Y}{M} \]

or

\[ M \times V = P \times Y \]

At this point, it is worth pausing to ask whether our definition has provided us with any insights into the workings of the economy. The answer is no. Because we defined V as the ratio of GDP to the money supply, the statement \( M \times V = P \times Y \) is an identity—it is true by definition. It contains no more useful information than the statement “A bachelor is an unmarried man.” The definition does not, for example, say anything about what will happen to \( P \times Y \) when M changes. The final value of \( P \times Y \) depends on what happens to V. If V falls when M increases, the product \( M \times V \) could stay the same, in which case the change in M would have had no effect on nominal income. To give monetarism some economic content, a simple version of monetarism known as the quantity theory of money is used.

The Quantity Theory of Money

The key assumption of the quantity theory of money is that the velocity of money is constant (or virtually constant) over time. If we let \( \bar{V} \) denote the constant value of V, the equation for the quantity theory can be written as follows:

\[ M \times \bar{V} = P \times Y \]

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velocity of money  The number of times a dollar bill changes hands, on average, during a year; the ratio of nominal GDP to the stock of money.

quantity theory of money  The theory based on the identity \( M \times V = P \times Y \) and the assumption that the velocity of money (V) is constant (or virtually constant).

Recall that GDP does not include transactions in intermediate goods (for example, flour sold to a baker to be made into bread) or in existing assets (for example, the sale of a used car). If these transactions are made using money, however, they do influence the number of times money changes hands during the course of a year. GDP is an imperfect measure of transactions to use in calculating the velocity of money.
Note that the double equal sign has replaced the triple equal sign because the equation is no longer an identity. The equation is true if velocity is constant (and equal to $V$) but not otherwise. If the equation is true, it provides an easy way to explain nominal GDP. Given $M$, which can be considered a policy variable set by the Federal Reserve (Fed), nominal GDP is just $M \times V$. In this case, the effects of monetary policy are clear. Changes in $M$ cause equal percentage changes in nominal GDP. For example, if the money supply doubles, nominal GDP also doubles. If the money supply remains unchanged, nominal GDP remains unchanged.

The key is whether the velocity of money is really constant. Early economists believed that the velocity of money was determined largely by institutional considerations, such as how often people are paid and how the banking system clears transactions between banks. Because these factors change gradually, early economists believed velocity was essentially constant.

When there is equilibrium in the money market, then the quantity of money supplied is equal to the quantity of money demanded. That could mean that $M$ in the quantity-theory equation equals both the quantity of money supplied and the quantity of money demanded. If the quantity-theory equation is looked on as a demand-for-money equation, it says that the demand for money depends on nominal income (GDP, or $P \times Y$), but not on the interest rate. The demand for money does not appear to depend only on nominal income.

Testing the Quantity Theory of Money

One way to test the validity of the quantity theory of money is to look at the demand for money using recent data on the U.S. economy. The key is this: Does money demand depend on the interest rate? Most empirical work says yes. When demand-for-money equations are estimated (or “fit to the data”), the interest rate usually turns out to be a factor. The demand for money does not appear to depend only on nominal income.

Another way of testing the quantity theory is to plot velocity over time and see how it behaves. Figure 33.1 plots the velocity of money for the 1960 I–2010 I period. The data show that velocity is far from constant. There is a long-term trend—on average, velocity has been rising during these years—but fluctuations around this trend have also occurred and some have been quite large. Velocity rose from 6.1 in 1980 III to 6.7 in 1981 III, fell to 6.3 in 1983 I, rose to 6.7 in 1984 III, and fell to 5.7 in 1986 IV. Changes of a few tenths of a point may seem small, but they are actually large. For example, the money supply in 1986 IV was $800 billion. If velocity changes by 0.3 with a money supply of this amount and if the money supply is unchanged, we have a change in nominal GDP ($P \times Y$) of $240$ billion ($0.3 \times $800 billion), which is about 5 percent of the level of GDP in 1986. The change in velocity in 2008-2009 was remarkable. Velocity fell from 9.3 in 2008 I to 7.3 in 2009 IV!

The debate over monetarist theories is more subtle than our discussion so far indicates. First, there are many definitions of the money supply. $M_1$ is the money supply variable used for the graph in Figure 33.1, but there may be some other measure of the money supply that would lead to a smoother plot. For example, many people shifted their funds from checking account deposits to money market accounts when the latter became available in the late 1970s. Because GDP did not change as a result of this shift while $M_1$ decreased, velocity—the ratio of GDP to $M_1$—must have gone up. Suppose instead we measured the supply of money by $M_2$ (which includes both checking accounts and money market accounts). In this case, the decrease in checking deposits would be exactly offset by the rise in money market account deposits and $M_2$ would not change. With no change in GDP and no change in $M_2$, the velocity of money would not change. Whether or not velocity is constant may depend partly on how we measure the money supply.

Second, there may be a time lag between a change in the money supply and its effects on nominal GDP. Suppose we experience a 10 percent increase in the money supply today, but it takes 1 year for nominal GDP to increase by 10 percent. If we measured the ratio of today’s money supply to today’s GDP, it would seem that velocity had fallen by 10 percent. However, if we measured today’s money supply against GDP 1 year from now, when the increase in the supply of money had its full effect on income, velocity would have been constant.

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1 In terms of the Appendix to Chapter 27, this means that the $LM$ curve is vertical.
The debate over the quantity theory of money is primarily empirical. It is a debate that can be resolved by looking at facts about the real world and seeing whether they are in accord with the predictions of theory. Is there a measure of the money supply and a choice of the time lag between a change in the money supply and its effects on nominal GDP such that \( V \) is in effect constant? If so, the monetarist theory is a useful approach to understanding how the macroeconomy works and how changes in the money supply will cause a proportionate increase in nominal GDP. If not, some other theory is likely to be more appropriate. (We discuss the testing of alternative theories at the end of this chapter.)

Inflation as a Purely Monetary Phenomenon

So far we have talked only about nominal output \((P \times Y)\). We have said nothing about how a monetarist would break down a change in nominal output (due to a money-supply change) into a change in \( P \) and a change in \( Y \). Here again it is not possible to make a general statement about what all monetarists believe. Some may believe that all of the change occurs in \( P \), and others may believe that at least sometimes some of the change occurs in \( Y \). If all the change occurs in \( P \), then there is a proportional relationship between changes in the money supply and changes in the price level. For example, a 10 percent change in \( M \) will lead to a 10 percent change in \( P \) if \( Y \) remains unchanged. In this case, inflation (an increase in \( P \)) is always a purely monetary phenomenon. The price level will not change if the money supply does not change. We call this view, that changes in \( M \) affect only \( P \) and not \( Y \), the “strict monetarist” view.

There is considerable disagreement as to whether the strict monetarist view is a good approximation of reality. For example, the strict view is not compatible with a nonvertical \( AS \) curve in the \( AS/AD \) model in Chapter 28. In the case of a nonvertical \( AS \) curve, an increase in \( M \), which shifts the \( AD \) curve to the right, increases both \( P \) and \( Y \). (You may want to review why.)

Almost all economists agree, however, that sustained inflation—inf lation that continues over many periods—is a purely monetary phenomenon. In the context of the \( AS/AD \) framework, inflation cannot continue indefinitely unless the Fed “accommodates” it by increasing the money supply. Let us review this.

Consider a continuously increasing level of government spending \((G)\) without any corresponding increase in taxes. The increases in \( G \) keep shifting the \( AD \) curve to the right, which leads to an increasing price level \((P)\). (You may find it useful to draw a graph now.) With a fixed money supply, the increases in \( P \) lead to a higher and higher interest rate, but there is a limit to how far this can go. Because taxes are unchanged, the government must finance the increases in \( G \) by issuing bonds, and there is a limit to how many bonds the public is willing to hold regardless of how high the interest rate goes. At the point at which the public cannot be induced to hold any more bonds, the government will be unable to borrow any more to finance its expenditures. Only if the
Fed is willing to increase the money supply (buy some of the government bonds) can the government spending (with its inflationary consequences) continue. Inflation cannot continue indefinitely without increases in the money supply.

The Keynesian/Monetarist Debate

The debate between Keynesians and monetarists was perhaps the central controversy in macroeconomics in the 1960s. The leading spokesman for monetarism was Milton Friedman from the University of Chicago. Most monetarists, including Friedman, blamed much of the instability in the economy on the Federal Reserve, arguing that the high inflation that the United States encountered from time to time could have been avoided if only the Fed had not expanded the money supply so rapidly. Monetarists were skeptical of the Fed’s ability to “manage” the economy—to expand the money supply during bad times and contract it during good times. A common argument against such management is the one discussed in Chapter 30: Time lags may make attempts to stimulate and contract the economy counterproductive.

Friedman advocated instead a policy of steady and slow money growth—specifically, that the money supply should grow at a rate equal to the average growth of real output (income) (\(Y\)). That is, the Fed should pursue a constant policy that accommodates real growth but not inflation.

Many Keynesians, on the other hand, advocated the application of coordinated monetary and fiscal policy tools to reduce instability in the economy—to fight inflation and unemployment. However, not all Keynesians advocated an activist federal government. Some rejected the strict monetarist position that changes in money affect only the price level in favor of the view that both monetary and fiscal policies make a difference. At the same time, though, they believed that the best possible policy for the government to pursue was basically noninterventionist.

Most economists now agree, after the experience of the 1970s, that monetary and fiscal tools are not finely calibrated. The notion that monetary and fiscal expansions and contractions can “fine-tune” the economy is gone forever. Still, many believe that the experiences of the 1970s also show that stabilization policies can help prevent even bigger economic disasters. Had the government not cut taxes and expanded the money supply in 1975 and in 1982, they argue, the recessions of those years might have been significantly worse. The same people would also argue that had the government not resisted the inflations of 1974–1975 and 1979–1981 with tight monetary policies, the inflations probably would have become much worse.

The debate between Keynesians and monetarists subsided with the advent of what we will call “new classical macroeconomics.” Before turning to this, however, it will be useful to consider a minor but interesting footnote in macroeconomic history: supply-side economics.

Supply-Side Economics

From our discussion of equilibrium in the goods market, beginning with the simple multiplier in Chapter 23 and continuing through Chapter 28, we have focused primarily on demand. Supply increases and decreases in response to changes in aggregate expenditure (which is closely linked to aggregate demand). Fiscal policy works by influencing aggregate expenditure through tax policy and government spending. Monetary policy works by influencing investment and consumption spending through increases and decreases in the interest rate. The theories we have been discussing are “demand-oriented.” Supply-side economics, as the name suggests, focuses on the supply side.

The argument of the supply-siders about the economy in the late 1970s and early 1980s was simple. The real problem, they said, was not demand, but high rates of taxation and heavy regulation that reduced the incentive to work, to save, and to invest. What was needed was not a demand stimulus, but better incentives to stimulate supply.

If we cut taxes so people take home more of their paychecks, the argument continued, they will work harder and save more. If businesses get to keep more of their profits and can get away from government regulations, they will invest more. This added labor supply and investment, or capital supply, will lead to an expansion of the supply of goods and services, which will reduce inflation and unemployment at the same time.
At their most extreme, supply-siders argued that the incentive effects of supply-side policies were likely to be so great that a major cut in tax rates would actually increase tax revenues. Even though tax rates would be lower, more people would be working and earning income and firms would earn more profits, so that the increases in the tax bases (profits, sales, and income) would then outweigh the decreases in rates, resulting in increased government revenues.

The Laffer Curve

Figure 33.2 presents a key diagram of supply-side economics. The tax rate is measured on the vertical axis, and tax revenue is measured on the horizontal axis. The assumption behind this curve is that there is some tax rate beyond which the supply response is large enough to lead to a decrease in tax revenue for further increases in the tax rate. There is obviously some tax rate between zero and 100 percent at which tax revenue is at a maximum. At a tax rate of zero, work effort is high but there is no tax revenue. At a tax rate of 100, the labor supply is presumably zero because people are not allowed to keep any of their income. Somewhere between zero and 100 is the maximum-revenue rate.

The big debate in the 1980s was whether tax rates in the United States put the country on the upper or lower part of the curve in Figure 33.2. The supply-side school claimed that the United States was around A and that taxes should be cut. Others argued that the United States was nearer B and that tax cuts would lead to lower tax revenue.

The diagram in Figure 33.2 is the Laffer curve, named after economist Arthur Laffer, who, legend has it, first drew it on the back of a napkin at a cocktail party. The Laffer curve had some influence on the passage of the Economic Recovery Tax Act of 1981, the tax package put forward by the Reagan administration that brought with it substantial cuts in both personal and business taxes. Individual income tax rates were cut by as much as 25 percent over 3 years. Corporate taxes were cut sharply in a way designed to stimulate capital investment. The new law allowed firms to depreciate their capital at a rapid rate for tax purposes, and the bigger deductions led to taxes that were significantly lower than before.

Evaluating Supply-Side Economics

Supporters of supply-side economics claim that Reagan’s tax policies were successful in stimulating the economy. They point to the fact that almost immediately after the tax cuts of 1981 were put into place, the economy expanded and the recession of 1980–1982 came to an end. In addition, inflation rates fell sharply from the high rates of 1980 and 1981. Except for 1 year, federal receipts continued to rise throughout the 1980s despite the cut in tax rates.

Critics of supply-side policies do not dispute these facts, but offer an alternative explanation of how the economy recovered. The Reagan tax cuts were enacted just as the U.S. economy was in the middle of its deepest recession since the Great Depression. The unemployment rate stood at 10.7 percent in the fourth quarter of 1982. It was the recession, critics argue, that was responsible for the reduction in inflation—not the supply-side policies. Also among the criticisms of supply-side
economics is that it is unlikely a tax cut would substantially increase the supply of labor. In addition, in theory, a tax cut could even lead to a reduction in labor supply. Recall our discussion of income and substitution effects in Chapter 31. Although it is true that a higher after-tax wage rate provides a higher reward for each hour of work and thus more incentive to work, a tax cut also means that households receive a higher income for a given number of hours of work. Because they can earn the same amount of money working fewer hours, households might choose to work less. They might spend some of their added income on leisure. Research done during the 1980s suggests that tax cuts seem to increase the supply of labor somewhat but that the increases are very modest.

What about the recovery from the recession? Why did real output begin to grow rapidly in late 1982, precisely when the supply-side tax cuts were taking effect? Two reasons have been suggested. First, the supply-side tax cuts had large demand-side effects that stimulated the economy. Second, the Fed pumped up the money supply and drove interest rates down at the same time the tax cuts were being put into effect. The money supply expanded about 20 percent between 1981 and 1983, and interest rates fell. In the third quarter of 1981, the average 3-month U.S. Treasury bill paid 15 percent interest. By the first quarter of 1983, the rate had dropped to 8.1 percent.

Certainly, traditional theory suggests that a huge tax cut will lead to an increase in disposable income and, in turn, an increase in consumption spending (a component of aggregate expenditure). In addition, although an increase in planned investment (brought about by a lower interest rate) leads to added productive capacity and added supply in the long run, it also increases expenditures on capital goods (new plant and equipment investment) in the short run.

Whether the recovery from the 1981–1982 recession was the result of supply-side expansion or supply-side policies that had demand-side effects, one thing is clear: The extreme promises of the supply-siders did not materialize. President Reagan argued that because of the effect depicted in the Laffer curve, the government could maintain expenditures (and even increase defense expenditures sharply), cut tax rates, and balance the budget. This was not the case. Government revenues fell sharply from levels that would have been realized without the tax cuts. After 1982, the federal government ran huge deficits, with about $2 trillion added to the national debt between 1983 and 1992.

New Classical Macroeconomics

The challenge to Keynesian and related theories has come from a school sometimes referred to as the new classical macroeconomics. Like monetarism and Keynesianism, this term is vague. No two new classical macroeconomists think exactly alike, and no single model completely represents this school. The following discussion, however, conveys the flavor of the new classical views.

The Development of New Classical Macroeconomics

A key complaint of new classical macroeconomics is the way traditional models treat expectations. Keynes himself recognized that expectations (in the form of “animal spirits”) play a big part in economic behavior. The problem is that traditional models assume that expectations are formed in naive ways. A common assumption, for example, is that people form their expectations of future inflation by assuming present inflation will continue. If they turn out to be wrong, they adjust their expectations by some fraction of the difference between their original forecast and the actual inflation rate. Suppose you expect 10 percent inflation next year. When next year comes, the inflation rate turns out to be only 5 percent, so you have made an error of 5 percentage points. You might then predict an inflation rate for the following year of 7.5 percent, halfway between your earlier expectation (10 percent) and actual inflation last year (5 percent).

The problem with this treatment of expectations is that it is not consistent with the assumptions of microeconomics. It implies that people systematically overlook information that would allow them to make better forecasts, even though there are costs to being wrong. If, as microeconomic theory assumes, people are out to maximize their satisfaction and firms are out to maximize their profits, they should form their expectations in a smarter way. Instead of naively

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3 The term *new classical* is used because many of the assumptions and conclusions of this group of economists resemble those of the classical economists—that is, those who wrote before Keynes.
assuming the future will be like the past or the present, they should actively seek to forecast the future. Any other behavior is not in keeping with the microeconomic view of the forward-looking, rational people who compose households and firms.

Rational Expectations

In previous chapters we emphasized households’ and firms’ expectations about the future. A firm’s decision to build a new plant depends on its expectations of future sales. The amount of saving a household undertakes today depends on its expectations about future interest rates, wages, and prices.

How are expectations formed? Do people assume that things will continue as they are at present (such as predicting rain tomorrow because it is raining today)? What information do people use to make their guesses about the future? Questions such as these have become central to current macroeconomic thinking and research. One theory, the rational-expectations hypothesis, offers a powerful way of thinking about expectations.

Suppose we want to forecast inflation. What does it mean to say that my expectations of inflation are “rational”? The rational-expectations hypothesis assumes that people know the “true model” that generates inflation—they know how inflation is determined in the economy—and they use this model to forecast future inflation rates. If there were no random, unpredictable events in the economy and if people knew the true model generating inflation, their forecasts of future inflation rates would be perfect. Because it is true, the model would not permit mistakes and thus the people using it would not make mistakes.

However, many events that affect the inflation rate are not predictable—they are random. By “true” model, we mean a model that is, on average, correct in forecasting inflation. Sometimes the random events have a positive effect on inflation, which means that the model underestimates the inflation rate, and sometimes they have a negative effect, which means that the model overestimates the inflation rate. On average, the model is correct. Therefore, rational expectations are correct on average even though their predictions are not exactly right all the time.

To see why, suppose you have to forecast how many times a fair coin will come up heads out of 100 tosses. The true model in this case is that the coin has a 50/50 chance of coming up heads on any one toss. Because the outcome of the 100 tosses is random, you cannot be sure of guessing correctly. If you know the true model—that the coin is fair—your rational expectation of the outcome of 100 tosses is 50 heads. You are not likely to be exactly right—the actual number of heads is likely to be slightly higher or slightly lower than 50—but on average, you will be correct.

Sometimes people are said to have rational expectations if they use “all available information” in forming their expectations. This definition is vague because it is not always clear what “all available information” means. The definition is precise if by “all available information” we mean that people know and use the true model. We cannot have more or better information than the true model!

If information can be obtained at no cost, people are not behaving rationally when they fail to use all available information. Because there are usually costs to making a wrong forecast, it is not rational to overlook information that could help improve the accuracy of a forecast as long as the costs of acquiring that information do not outweigh the benefits of improving its accuracy.

Rational Expectations and Market Clearing  If firms have rational expectations and if they set prices and wages on this basis, on average, prices and wages will be set at levels that ensure equilibrium in the goods and labor markets. When a firm has rational expectations, it knows the demand curve for its output and the supply curve of labor that it faces, except when random shocks disrupt those curves. Therefore, on average, the firm will set the market-clearing prices and wages. The firm knows the true model, and it will not set wages different from those it expects will attract the number of workers it wants. If all firms behave this way, wages will be set in such a way that the total amount of labor supplied will, on average, be equal to the total amount of labor that firms demand. In other words, on average, there will be full employment.

In Chapter 29, we argued that there might be disequilibrium in the labor market (in the form of either unemployment or excess demand for workers) because firms may make mistakes in their wage-setting behavior due to expectation errors. If, on average, firms do not make errors, on average, there will be equilibrium. When expectations are rational, disequilibrium exists only temporarily as a result of random, unpredictable shocks—obviously an important conclusion. If
true, it means that disequilibrium in any market is only temporary because firms, on average, set market-clearing wages and prices.

The assumption that expectations are rational radically changes the way we can view the economy. We go from a world in which unemployment can exist for substantial periods and the multiplier can operate to a world in which (on average) all markets clear and there is full employment. In this world, there is no need for government stabilization policies. Unemployment is not a problem that governments need to worry about; if it exists at all, it is because of unpredictable shocks that, on average, amount to zero. There is no more reason for the government to try to change the outcome in the labor market than there is for it to change the outcome in the banana market. On average, prices and wages are set at market-clearing levels.

The Lucas Supply Function  

The Lucas supply function, named after Robert E. Lucas of the University of Chicago, is an important part of a number of new classical macroeconomic theories. It yields, as we shall see, a surprising policy conclusion. The function is deceptively simple. It says that real output (Y) depends on (is a function of) the difference between the actual price level (P) and the expected price level (Pe):

\[ Y = f(P - Pe) \]

The actual price level minus the expected price level (P − Pe) is the price surprise. Before considering the policy implications of this function, we should look at the theory behind it.

Lucas begins by assuming that people and firms are specialists in production but generalists in consumption. If someone you know is a manual laborer, the chances are that she sells only one thing—labor. If she is a lawyer, she sells only legal services. In contrast, people buy a large bundle of goods—ranging from gasoline to ice cream and pretzels—on a regular basis. The same is true for firms. Most companies tend to concentrate on producing a small range of products, but they typically buy a larger range of inputs—raw materials, labor, energy, and capital. According to Lucas, this divergence between buying and selling creates an asymmetry. People know more about the prices of the things they sell than they do about the prices of the things they buy.

At the beginning of each period, a firm has some expectation of the average price level for that period. If the actual price level turns out to be different, there is a price surprise. Suppose the
average price level is higher than expected. Because the firm learns about the actual price level slowly, some time goes by before it realizes that all prices have gone up. The firm does learn quickly that the price of its output has gone up. The firm perceives—incorrectly, it turns out—that its price has risen relative to other prices, and this perception leads it to produce more output.

A similar argument holds for workers. When there is a positive price surprise, workers at first believe that their “price”—their wage rate—has increased relative to other prices. Workers believe that their real wage rate has risen. We know from theory that an increase in the real wage is likely to encourage workers to work more hours. The real wage has not actually risen, but it takes workers a while to figure this out. In the meantime, they supply more hours of work than they would have. This increase means that the economy produces more output when prices are unexpectedly higher than when prices are at their expected level.

This is the rationale for the Lucas supply function. Unexpected increases in the price level can fool workers and firms into thinking that relative prices have changed, causing them to alter the amount of labor or goods they choose to supply.

Policy Implications of the Lucas Supply Function The Lucas supply function in combination with the assumption that expectations are rational implies that anticipated policy changes have no effect on real output. Consider a change in monetary policy. In general, the change will have some effect on the average price level. If the policy change is announced to the public, people will know the effect on the price level because they have rational expectations (and know the way changes in monetary policy affect the price level). This means that the change in monetary policy affects the actual price level and the expected price level in the same way. The new price level minus the new expected price level is zero—no price surprise. In such a case, there will be no change in real output because the Lucas supply function states that real output can change from its fixed level only if there is a price surprise.

The general conclusion is that any announced policy change—in fiscal policy or any other policy—has no effect on real output because the policy change affects both actual and expected price levels in the same way. If people have rational expectations, known policy changes can produce no price surprises—and no increases in real output. The only way any change in government policy can affect real output is if it is kept in the dark so it is not generally known. Government policy can affect real output only if it surprises people; otherwise, it cannot. Rational-expectations theory combined with the Lucas supply function proposes a very small role for government policy in the economy.

Real Business Cycle Theory and New Keynesian Economics

Research that followed Lucas’s work was concerned with whether the existence of business cycles can be explained under the assumptions of complete price and wage flexibility (market clearing) and rational expectations. This work is called real business cycle theory. As we discussed in Chapter 28, if prices and wages are completely flexible, then the AS curve is vertical, even in the short run. If the AS curve is vertical, then events or phenomena that shift the AD curve (such as changes in the money supply, changes in government spending, and shocks to consumer and investor behavior) have no effect on real output. Real output does fluctuate over time, so the puzzle is how the fluctuations can be explained if they are not due to policy changes or other shocks that shift the AD curve. Solving this puzzle is one of the main missions of real business cycle theory.

It is clear that if shifts of the AD curve cannot account for real output fluctuations (because the AS curve is vertical), then shifts of the AS curve must be responsible. However, the task is to come up with convincing explanations as to what causes these shifts and why they persist over a number of periods. The problem is particularly difficult when it comes to the labor market. If prices and wages are completely flexible, then there is never any unemployment aside from frictional unemployment. For example, because the measured U.S. unemployment rate was 4.0 percent in 2000 and 9.3 percent in 2009, the puzzle is to explain why so many more people chose not to work in 2009 than in 2000.

4 This is true if we assume that the substitution effect dominates the income effect (see Chapter 32).
Early real business cycle theorists emphasized shocks to the production technology. Suppose there is a negative shock in a given year that causes the marginal product of labor to decline. This leads to a fall in the real wage, which leads to a decrease in the quantity of labor supplied. People work less because the negative technology shock has led to a lower return from working. The opposite happens when there is a positive shock: The marginal product of labor rises, the real wage rises, and people choose to work more. This research was not as successful as some had hoped because it required what seemed to be unrealistically large shocks to explain the observed movements in labor supply over time.

What has come to be called new Keynesian economics retains the assumption of rational expectations, but drops the assumption of completely flexible prices and wages. Prices and wages are assumed to be sticky. The existence of menu costs is often cited as a justification of the assumption of sticky prices. It may be costly for firms to change prices, which prevents firms from having completely flexible prices. Sticky wages are discussed in Chapter 29, and some of the arguments given there as to why wages might be sticky may be relevant to new Keynesian models. A main issue regarding these models is that any justification has to be consistent with all agents in the model having rational expectations.

Current research in new Keynesian economics broadly defined is vast. There are many models, often called dynamic stochastic general equilibrium (DSGE) models. The properties of these models vary, but most have the feature—because of the assumption of sticky prices and wages—that monetary policy can affect real output. The government generally has some role to play in these models.

Evaluating the Rational Expectations Assumption

Almost all models in new classical macroeconomics—Lucas’s model, real business cycle models, new Keynesian models—assume rational expectations. A key question concerning how realistic these models are is thus how realistic the assumption of rational expectations is. If this assumption approximates the way expectations are actually formed, then it calls into question any theory that relies at least in part on expectation errors for the existence of disequilibrium. The arguments in favor of the rational expectations assumption sound persuasive from the perspective of microeconomic theory. When expectations are not rational, there are likely to be unexploited profit opportunities, and most economists believe such opportunities are rare and short-lived.

The argument against rational expectations is that it requires households and firms to know too much. This argument says that it is unrealistic to think that these basic decision-making units know as much as they need to know to form rational expectations. People must know the true model (or at least a good approximation of the true model) to form rational expectations, and this knowledge is a lot to expect. Even if firms and households are capable of learning the true model, it may be costly to take the time and gather the relevant information to learn it. The gain from learning the true model (or a good approximation of it) may not be worth the cost. In this sense, there may not be unexploited profit opportunities around. Gathering information and learning economic models may be too costly to bother with, given the expected gain from improving forecasts.

Although the assumption that expectations are rational seems consistent with the satisfaction-maximizing and profit-maximizing postulates of microeconomics, the rational expectations assumption is more extreme and demanding because it requires more information on the part of households and firms. Consider a firm engaged in maximizing profits. In some way or other, it forms expectations of the relevant future variables, and given these expectations, it figures out the best thing to do from the point of view of maximizing profits. Given a set of expectations, the problem of maximizing profits may not be too hard. What may be hard is forming accurate expectations in the first place. This requires firms to know much more about the overall economy than they are likely to, so the assumption that their expectations are rational is not necessarily realistic. Firms, like the rest of us—so the argument goes—grope around in a world that is difficult to understand, trying to do their best but not always understanding enough to avoid mistakes.

In the final analysis, the issue is empirical. Does the assumption of rational expectations stand up well against empirical tests? This question is difficult to answer. Much work is currently being done to answer it. There are no conclusive results yet, although the results discussed in the Economics in Practice on p. 657 are not supportive of the rational expectations assumption.
Testing Alternative Macroeconomic Models

You may wonder why there is so much disagreement in macroeconomics. Why can’t macroeconomists test their models against one another and see which performs best?

One problem is that macroeconomic models differ in ways that are hard to standardize. If one model takes the price level to be given, or not explained within the model, and another one does not, the model with the given price level may do better in, for instance, predicting output—not because it is a better model but simply because the errors in predicting prices have not been allowed to affect the predictions of output. The model that takes prices as given has a head start, so to speak.

Another problem arises in the testing of the rational expectations assumption. Remember, if people have rational expectations, they are using the true model to form their expectations. Therefore, to test this assumption, we need the true model. There is no way to be sure that whatever model is taken to be the true model is in fact the true one. Any test of the rational expectations hypothesis is therefore a joint test: (1) that expectations are formed rationally and (2) that the model being used is the true one. If the test rejects the hypothesis, it may be that the model is wrong rather than that the expectations are not rational.

Another problem for macroeconomists is the small amount of data available. Most empirical work uses data beginning about 1950, which in 2010 was about 61 years’ (244 quarters) worth of data. Although this may seem like a lot of data, it is not. Macroeconomic data are fairly “smooth,” which means that a typical variable does not vary much from quarter to quarter or from year to year. For example, the number of business cycles within this 61-year period is small, about eight. Testing various macroeconomic hypotheses on the basis of eight business cycle observations is not easy, and any conclusions must be interpreted with caution.

To give an example of the problem of a small number of observations, consider trying to test the hypothesis that import prices affect domestic prices. Import prices changed very little in the 1950s and 1960s. Therefore, it would have been very difficult at the end of the 1960s to estimate the effect of import prices on domestic prices. The variation in import prices was not great enough to show any effects. We cannot demonstrate that changes in import prices help explain changes in domestic prices if import prices do not change. The situation was different by the end of the 1970s because by then, import prices had varied considerably. By the end of the 1970s, there were good estimates of the import price effect, but not before. This kind of problem is encountered again and again in empirical macroeconomics. In many cases, there are not enough observations for much to be said and hence there is considerable room for disagreement.

We said in Chapter 1 that it is difficult in economics to perform controlled experiments. Economists, are for the most part, at the mercy of the historical data. If we were able to perform experiments, we could probably learn more about the economy in a shorter time. Alas, we must wait. In time, the current range of disagreements in macroeconomics should be considerably narrowed.

**SUMMARY**

**KEYNESIAN ECONOMICS** p. 649

1. In a broad sense, Keynesian economics is the foundation of modern macroeconomics. In a narrower sense, Keynesian refers to economists who advocate active government intervention in the economy.

**MONETARISM** p. 650

2. The monetarist analysis of the economy places a great deal of emphasis on the velocity of money, which is defined as the ratio of nominal GDP to the stock of money, or \( V = \frac{GDP}{M} \). Alternately, \( M \times V = P \times Y \).

3. The quantity theory of money assumes that velocity is constant (or virtually constant). This implies that changes in the supply of money will lead to equal percentage changes in nominal GDP. The quantity theory of money equation is \( M \times V = P \times Y \). The equation says that demand for money does not depend on the interest rate.

4. Most economists believe that sustained inflation is a purely monetary phenomenon. Inflation cannot continue indefinitely unless the Fed “accommodates” it by expanding the money supply.

5. Most monetarists blame most of the instability in the economy on the federal government and are skeptical of the government’s ability to manage the macroeconomy. They argue that the money supply should grow at a rate equal to the average growth of real output (income) \( Y \)—the Fed should expand the money supply to accommodate real growth but not inflation.

**SUPPLY-SIDE ECONOMICS** p. 653

6. Supply-side economics focuses on incentives to stimulate supply. Supply-side economists believe that if we lower taxes, workers will work harder and save more and firms will invest more and produce more. At their most extreme, supply-siders argue that incentive effects are likely to be so great that a major cut in taxes will actually increase tax revenues.
7. The *Laffer curve* shows the relationship between tax rates and tax revenues. Supply-side economists use it to argue that it is possible to generate higher revenues by cutting tax rates. This does not appear to have been the case during the Reagan administration, however, where lower tax rates decreased tax revenues significantly and contributed to the large increase in the federal debt during the 1980s.

NEW CLASSICAL MACROECONOMICS p. 655

8. New classical macroeconomics uses the assumption of rational expectations. The *rational expectations hypothesis* assumes that people know the “true model” that generates economic variables. For example, rational expectations assumes that people know how inflation is determined in the economy and use this model to forecast future inflation rates.

9. The *Lucas supply function* assumes that real output ($Y$) depends on the actual price level minus the expected price level, or the *price surprise*. This function combined with the assumption that expectations are rational implies that anticipated policy changes have no effect on real output.

10. *Real business cycle theory* is an attempt to explain business cycle fluctuations under the assumptions of complete price and wage flexibility and rational expectations. It emphasizes shocks to technology and other shocks.

11. *New Keynesian economics* relaxes the assumption of complete price and wage flexibility. There is usually a role for government policy in these models.

TESTING ALTERNATIVE MACROECONOMIC MODELS p. 660

12. Economists disagree about which macroeconomic model is best for several reasons: (1) Macroeconomic models differ in ways that are hard to standardize; (2) when testing the rational-expectations assumption, we are never sure that whatever model is taken to be the true model is the true one; and (3) the amount of data available is fairly small.

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**REVIEW TERMS AND CONCEPTS**

- *Laffer curve*, p. 654
- *Lucas supply function*, p. 657
- *new Keynesian economics*, p. 659
- *price surprise*, p. 657
- *quantity theory of money*, p. 650
- *rational expectations hypothesis*, p. 656
- *real business cycle theory*, p. 658
- *velocity of money*, p. 650

**PROBLEMS**

All problems are available on www.myeconlab.com

1. The table gives estimates of the rate of money supply growth and the rate of real GDP growth for five countries in 2000:

<table>
<thead>
<tr>
<th>Country</th>
<th>Rate of Growth in Money Supply (M1)</th>
<th>Rate of Growth of Real GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>+9.3</td>
<td>+4.4</td>
</tr>
<tr>
<td>Britain</td>
<td>+7.6</td>
<td>+4.4</td>
</tr>
<tr>
<td>Canada</td>
<td>+18.7</td>
<td>+4.9</td>
</tr>
<tr>
<td>Japan</td>
<td>+9.0</td>
<td>+0.7</td>
</tr>
<tr>
<td>United States</td>
<td>+0.2</td>
<td>+5.1</td>
</tr>
</tbody>
</table>

a. If you were a monetarist, what would you predict about the rate of inflation across the five countries?

b. If you were a Keynesian and assuming activist central banks, how might you interpret the same data?

2. The three diagrams in Figure 1 represent in a simplified way the predictions of the three theories presented in this chapter about the likely effects of a major tax cut.

a. Match each of the following theories with a graph:
   - (1) *Keynesian economics*, (2) *supply-side economics*, (3) *rational expectations/monetarism*. Explain the logic behind the three graphs.

b. Which theory do you find most convincing? Explain.

---

*FIGURE 1*
3. [Related to the Economics in Practice on p. 657] Suppose you are thinking about where to live after you finish your degree. You discover that an apartment building near your new job has identical units—one is for rent and the other for sale as a condominium. Given your salary, both are affordable and you like them. Would you buy or rent? How would you go about deciding? Would your expectations play a role? Be specific. Where do you think those expectations come from? In what ways could expectations change things in the housing market as a whole?

4. In 2000, a well-known economist was heard to say, “The problem with supply-side economics is that when you cut taxes, they have both supply and demand side effects and you cannot separate the effects.” Explain this comment. Be specific and use the 1997 tax cuts or the Reagan tax cuts of 1981 as an example.

5. A cornerstone of new classical economics is the notion that expectations are “rational.” What do you think will happen to the prices of single-family homes in your community over the next several years? On what do you base your expectations? Is your thinking consistent with the notion of rational expectations? Explain.

6. You are a monetarist given the following information: The money supply is $1,000. The velocity of money is 5. What is nominal income? Real income? What happens to nominal income if the money supply is doubled? What happens to real income?

7. When Bill Clinton took office in January 1993, he faced two major economic problems: a large federal budget deficit and high unemployment resulting from a very slow recovery from the recession of 1990 to 1991. In his first State of the Union message, the president called for spending cuts and substantial tax increases to reduce the deficit. Most of these proposed spending cuts were in the defense budget. The following day Alan Greenspan, chair of the Federal Reserve Board of Governors, signaled his support for the president’s plan. Many elements of the president’s original plan were later incorporated into the deficit reduction bill passed in 1993.

   a. Some said at the time that without the Fed’s support, the Clinton plan would be a disaster. Explain this argument.
   b. Supply-side economists and monetarists were very worried about the plan and the support it received from the Fed. What specific problems might a monetarist and a supply-side economist worry about?
   c. Suppose you were hired by the Federal Reserve Bank of St. Louis to report on the events of 1995 and 1996. What specific evidence would you look for to see whether the Clinton plan was effective or whether the critics were right to be skeptical?

8. In an economy with reasonably flexible prices and wages, full employment is almost always maintained. Explain why that statement is true.

9. During the 1980 presidential campaign, Ronald Reagan promised to cut taxes, increase expenditures on national defense, and balance the budget. During the New Hampshire primary of 1980, George Bush called this policy “voodoo economics.” The two men were arguing about the relative merits of supply-side economics. Explain their disagreement.

10. In a hypothetical economy, there is a simple proportional tax on wages imposed at a rate \( t \). There are plenty of jobs around; so if people enter the labor force, they can find work. We define total government receipts from the tax as

\[
T = t \times W \times L
\]

where \( t \) is the tax rate, \( W \) is the gross wage rate, and \( L \) is the total supply of labor. The net wage rate is

\[
W_n = (1 - t) W
\]

The elasticity of labor supply is defined as

\[
\frac{\Delta L}{\Delta W_n} / \frac{L}{W_n}
\]

Suppose \( t \) was cut from .25 to .20. For such a cut to increase total government receipts from the tax, how elastic must the supply of labor be? (Assume a constant gross wage.) What does your answer imply about the supply-side assertion that a cut in taxes can increase tax revenues?

11. The following is data from 2010 for the tiny island nation of Papaya: money supply = 600 million; price level = 2.5; velocity of money = 4. Use the quantity theory of money to answer the following questions.
   a. What is the value of real output (income) in 2010?
   b. What is the value of nominal GDP in 2010?
   c. If real output doubled, by how much would the money supply need to change?
   d. If velocity is constant and Papaya was experiencing a recession in 2010, what impact would an easy money policy have on nominal GDP?
   e. If the annual GDP growth rate is 8 percent in Papaya, by how much will the money supply need to change in 2011?

12. In the nation of Lower Vicuna, the velocity of money is fairly constant, and in the nation of Upper Vicuna, the velocity of money fluctuates greatly. For which nation would the quantity theory of money better explain changes in nominal GDP? Explain.

13. The economy of Carmona is represented by the following Lucas supply function: \( Y = 600 + 40(P - P^e) \). The current price level in Carmona is 1.8, and the expected price level is 1.95.
   a. What will be the new level of real output if inflation expectations are correct?
   b. What will be the new level of real output if inflation expectations are wrong and the actual price level rises to 2.0?
   c. What will be the new level of real output if the actual price level does not change?
   d. What is the value of the “price surprise” in parts a, b, and c?

14. If households and firms have rational expectations, is it possible for the unemployment rate to exceed the natural rate of unemployment? Explain.

15. Assume people and firms have rational expectations. Explain how each of the following events will affect aggregate output and the price level.
   a. The Fed unexpectedly decreases the required reserve ratio.
   b. Congress passes a tax reduction bill which will go into effect in one year and last for ten years.
   c. The Fed announces it will decrease the supply of money.
   d. Without notice, OPEC cuts oil production by 50 percent.
   e. The government passes a previously unannounced emergency defense spending bill, authorizing an immediate $500 billion increase in funding.

*Note: Problems marked with an asterisk are more challenging.*
International Trade, Comparative Advantage, and Protectionism

Over the last 40 years, international transactions have become increasingly important to the U.S. economy. In 1970, imports represented only about 7 percent of U.S. gross domestic product (GDP). The share is now around 15 percent. In 2010, the United States imported about $180 billion worth of goods and services each month. The increased trade we observe in the United States is mirrored throughout the world. From 1980 to 2009, world trade in real terms grew more than sixfold. This trend has been especially rapid in the newly industrialized Asian economies, but many developing countries such as Malaysia and Vietnam have been increasing their openness to trade.

The “internationalization” or “globalization” of the U.S. economy has occurred in the private and public sectors, in input and output markets, and in firms and households. Once uncommon, foreign products are now everywhere, from the utensils we eat with to the cars we drive. Chinese textiles and Indian software are commonplace. It might surprise you to learn that many of the cut flowers sold in the United States are grown in Africa and South America. In fact, most products today are made in a number of countries. Back in Chapter 1, we presented an Economics in Practice that described the production of Apple's iPod. An iPod contains 451 parts made in countries scattered around the world including Korea, Japan, China, and the United States. The bottom of the iPod has the following information: “Assembled in China; Designed in California.” Suzuki makes cars in Hungary and employs workers from Romania and Slovakia. Honda started producing Japanese motorcycles in Ohio in 1977 with 64 employees in Marysville. The company now employs over 12,000 workers who assemble Honda automobiles. Bose is based in the United States but has its electronic components assembled in Mexico.

At the same time, the United States exports billions of dollars’ worth of agricultural goods, aircraft, and industrial machinery. Korea imports substantial amounts of U.S. beef. In addition, the United States exports and imports large quantities of services. When a Pakistani student enrolls in an American college or university, or a sick woman from Chile seeks medical attention in a U.S. hospital, or a Kenyan hires a lawyer in Miami to help him with a real estate deal, or a...
TABLE 34.1
U.S. Balance of Trade (Exports Minus Imports), 1929–2009 (Billions of Dollars)

<table>
<thead>
<tr>
<th>Year</th>
<th>Exports Minus Imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>1929</td>
<td>+0.4</td>
</tr>
<tr>
<td>1933</td>
<td>+0.1</td>
</tr>
<tr>
<td>1945</td>
<td>−0.8</td>
</tr>
<tr>
<td>1955</td>
<td>+0.5</td>
</tr>
<tr>
<td>1960</td>
<td>+4.2</td>
</tr>
<tr>
<td>1965</td>
<td>+5.6</td>
</tr>
<tr>
<td>1970</td>
<td>+4.0</td>
</tr>
<tr>
<td>1975</td>
<td>+16.0</td>
</tr>
<tr>
<td>1976</td>
<td>−1.6</td>
</tr>
<tr>
<td>1977</td>
<td>−23.1</td>
</tr>
<tr>
<td>1978</td>
<td>−25.4</td>
</tr>
<tr>
<td>1979</td>
<td>−22.5</td>
</tr>
<tr>
<td>1980</td>
<td>−13.1</td>
</tr>
<tr>
<td>1981</td>
<td>−12.5</td>
</tr>
<tr>
<td>1982</td>
<td>−20.0</td>
</tr>
<tr>
<td>1983</td>
<td>−51.7</td>
</tr>
<tr>
<td>1984</td>
<td>−102.7</td>
</tr>
<tr>
<td>1985</td>
<td>−115.2</td>
</tr>
<tr>
<td>1986</td>
<td>−132.5</td>
</tr>
<tr>
<td>1987</td>
<td>−145.0</td>
</tr>
<tr>
<td>1988</td>
<td>−110.1</td>
</tr>
<tr>
<td>1989</td>
<td>−87.9</td>
</tr>
<tr>
<td>1990</td>
<td>−77.6</td>
</tr>
<tr>
<td>1991</td>
<td>−27.0</td>
</tr>
<tr>
<td>1992</td>
<td>−32.8</td>
</tr>
<tr>
<td>1993</td>
<td>−64.4</td>
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<tr>
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</tr>
<tr>
<td>1995</td>
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</tr>
<tr>
<td>1996</td>
<td>−96.3</td>
</tr>
<tr>
<td>1997</td>
<td>−101.4</td>
</tr>
<tr>
<td>1998</td>
<td>−161.8</td>
</tr>
<tr>
<td>1999</td>
<td>−262.1</td>
</tr>
<tr>
<td>2000</td>
<td>−382.1</td>
</tr>
<tr>
<td>2001</td>
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</tr>
<tr>
<td>2002</td>
<td>−427.2</td>
</tr>
<tr>
<td>2003</td>
<td>−304.1</td>
</tr>
<tr>
<td>2004</td>
<td>−618.7</td>
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<tr>
<td>2005</td>
<td>−722.7</td>
</tr>
<tr>
<td>2006</td>
<td>−769.3</td>
</tr>
<tr>
<td>2007</td>
<td>−713.8</td>
</tr>
<tr>
<td>2008</td>
<td>−707.8</td>
</tr>
<tr>
<td>2009</td>
<td>−392.4</td>
</tr>
</tbody>
</table>


Trade Surpluses and Deficits

Until the 1970s, the United States generally exported more than it imported. When a country exports more than it imports, it runs a **trade surplus**. When a country imports more than it exports, it runs a **trade deficit**. Table 34.1 shows that before 1976 the United States generally ran a trade surplus. This changed in 1976, and since 1976 the United States has run a trade deficit. The deficit reached a local peak of $145.0 billion in 1987, fell to $27.0 billion in 1991, and then rose dramatically to over $700 billion by 2005. By 2009, the trade deficit had fallen to just under $400 billion, as U.S. imports declined more than U.S. exports during the recession.

The large trade deficits in the middle and late 1980s sparked political controversy that continues today. Foreign competition hit U.S. markets hard. Less expensive foreign goods—among them steel, textiles, and automobiles—began driving U.S. manufacturers out of business, and thousands of jobs were lost in important industries. Cities such as Pittsburgh, Youngstown, and Detroit had major unemployment problems. In more recent times, the outsourcing of software development to India has caused complaints from white-collar workers.

The natural reaction to trade-related job dislocation is to call for protection of U.S. industries. Many people want the president and Congress to impose taxes and import restrictions that would make foreign goods less available and more expensive, protecting U.S. jobs. This argument is not new. For hundreds of years, industries have petitioned governments for protection and societies have debated the pros and cons of free and open trade. For the last century and a half, the principal argument against protection has been the theory of comparative advantage, first discussed in Chapter 2.
The Economic Basis for Trade: Comparative Advantage

Perhaps the best-known debate on the issue of free trade took place in the British Parliament during the early years of the nineteenth century. At that time, the landed gentry—the landowners—controlled Parliament. For a number of years, imports and exports of grain had been subject to a set of tariffs, subsidies, and restrictions collectively called the Corn Laws. Designed to discourage imports of grain and to encourage exports, the Corn Laws’ purpose was to keep the price of food high. The landlords’ incomes, of course, depended on the prices they got for what their land produced. The Corn Laws clearly worked to the advantage of those in power.

With the Industrial Revolution, a class of wealthy industrial capitalists emerged. The industrial sector had to pay workers at least enough to live on, and a living wage depended greatly on the price of food. Tariffs on grain imports and export subsidies that kept grain and food prices high increased the wages that capitalists had to pay, cutting into their profits. The political battle raged for years. However, as time went by, the power of the landowners in the House of Lords was significantly reduced. When the conflict ended in 1848, the Corn Laws were repealed.

On the side of repeal was David Ricardo, a businessman, economist, member of Parliament, and one of the fathers of modern economics. Ricardo’s principal work, Principles of Political Economy and Taxation, was published in 1817, two years before he entered Parliament. Ricardo’s theory of comparative advantage, which he used to argue against the Corn Laws, claimed that trade enables countries to specialize in producing the products they produce best. According to the theory specialization and free trade will benefit all trading partners (real wages will rise), even those that may be absolutely less efficient producers. This basic argument remains at the heart of free-trade theory specialization and free trade will benefit all trading partners (real wages will rise), even those that may be absolutely less efficient producers.

Absolute Advantage versus Comparative Advantage

A country enjoys an absolute advantage over another country in the production of a good if it uses fewer resources to produce that good than the other country does. Suppose country A and country B produce wheat, but A’s climate is more suited to wheat and its labor is more productive. Country A will produce more wheat per acre than country B and use less labor in growing it and bringing it to market. Country A enjoys an absolute advantage over country B in the production of wheat.

A country enjoys a comparative advantage in the production of a good if that good can be produced at lower cost in terms of other goods. Suppose countries C and D both produce wheat and corn and C enjoys an absolute advantage in the production of both—that is, C’s climate is better than D’s and fewer of C’s resources are needed to produce a given quantity of both wheat and corn. Now C and D must each choose between planting land with either wheat or corn. To produce more wheat, either country must transfer land from corn production; to produce more corn, either country must transfer land from wheat production. The cost of wheat in each country can be measured in bushels of corn, and the cost of corn can be measured in bushels of wheat.

Suppose that in country C, a bushel of wheat has an opportunity cost of 2 bushels of corn. That is, to produce an additional bushel of wheat, C must give up 2 bushels of corn. At the same time, producing a bushel of wheat in country D requires the sacrifice of only 1 bushel of corn. Even though C has an absolute advantage in the production of both products, D enjoys a comparative advantage in the production of wheat because the opportunity cost of producing wheat is lower in D. Under these circumstances, Ricardo claims, D can benefit from trade if it specializes in the production of wheat.
Gains from Mutual Absolute Advantage  To illustrate Ricardo’s logic in more detail, suppose Australia and New Zealand each have a fixed amount of land and do not trade with the rest of the world. There are only two goods—wheat to produce bread and cotton to produce clothing. This kind of two-country/two-good world does not exist, but its operations can be generalized to many countries and many goods.

To proceed, we have to make some assumptions about the preferences of the people living in New Zealand and the people living in Australia. If the citizens of both countries walk around naked, there is no need to produce cotton, so all the land can be used to produce wheat. However, assume that people in both countries have similar preferences with respect to food and clothing: The populations of both countries use both cotton and wheat, and preferences for food and clothing are such that both countries consume equal amounts of wheat and cotton.

Finally, we assume that each country has only 100 acres of land for planting and that land yields are as given in Table 34.2. New Zealand can produce 3 times the wheat that Australia can on 1 acre of land, and Australia can produce 3 times the cotton that New Zealand can in the same space. New Zealand has an absolute advantage in the production of wheat, and Australia has an absolute advantage in the production of cotton. In cases like this, we say the two countries have mutual absolute advantage.

If there is no trade and each country divides its land to obtain equal units of cotton and wheat production, each country produces 150 bushels of wheat and 150 bales of cotton. New Zealand puts 75 acres into cotton but only 25 acres into wheat, while Australia does the reverse (Table 34.3).

We can organize the same information in graphic form as production possibility frontiers for each country. In Figure 34.1, which presents the positions of the two countries before trade, each country is constrained by its own resources and productivity. If Australia put all its land into cotton, it would produce 600 bales of cotton (100 acres × 6 bales/acre) and no wheat; if it put all its land into wheat, it would produce 200 bushels of wheat (100 acres × 2 bushels/acre) and no cotton. The opposite is true for New Zealand. Recall from Chapter 2 that a country’s production possibility frontier represents all combinations of goods that can be produced, given the country’s resources and state of technology. Each country must pick a point along its own production possibility curve.

When both countries have an absolute advantage in the production of one product, it is easy to see that specialization and trade will benefit both. Australia should produce cotton, and New Zealand should produce wheat. Transferring all land to wheat production in New Zealand yields 600 bushels, while transferring all land to cotton production in Australia yields 600 bales. An agreement to trade 300 bushels of wheat for 300 bales of cotton would double both wheat and cotton consumption in both countries. (Remember, before trade, both countries produced 150 bushels of wheat and 150 bales of cotton. After trade, each country will have 300 bushels of wheat and 300 bales of cotton to consume. Final production and trade figures are provided in Table 34.4 and Figure 34.2.) Trade enables both countries to move beyond their previous resource and productivity constraints.

The advantages of specialization and trade seem obvious when one country is technologically superior at producing one product and another country is technologically superior at producing another product. However, let us turn to the case in which one country has an absolute advantage in the production of both goods.
FIGURE 34.1 Production Possibility Frontiers for Australia and New Zealand
Before Trade
Without trade, countries are constrained by their own resources and productivity.

TABLE 34.4 Production and Consumption of Wheat and Cotton After Specialization

<table>
<thead>
<tr>
<th>Production</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>New Zealand</td>
</tr>
<tr>
<td>Wheat</td>
<td>100 acres × 6</td>
</tr>
<tr>
<td></td>
<td>6 bushels/acre</td>
</tr>
<tr>
<td>Cotton</td>
<td>0 acres</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

FIGURE 34.2 Expanded Possibilities After Trade
Trade enables both countries to move beyond their own resource constraints—beyond their individual production possibility frontiers.
Gains from Comparative Advantage  Table 34.5 contains different land yield figures for New Zealand and Australia. Now New Zealand has a considerable absolute advantage in the production of both cotton and wheat, with 1 acre of land yielding 6 times as much wheat and twice as much cotton as 1 acre in Australia. Ricardo would argue that *specialization and trade are still mutually beneficial*.

<table>
<thead>
<tr>
<th>TABLE 34.5 Yield per Acre of Wheat and Cotton</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Zealand</td>
</tr>
<tr>
<td>Wheat</td>
</tr>
<tr>
<td>Cotton</td>
</tr>
</tbody>
</table>

Again, preferences imply consumption of equal units of cotton and wheat in both countries. With no trade, New Zealand would divide its 100 available acres evenly, or 50/50, between the two crops. The result would be 300 bales of cotton and 300 bushels of wheat. Australia would divide its land 75/25. Table 34.6 shows that final production in Australia would be 75 bales of cotton and 75 bushels of wheat. (Remember, we are assuming that in each country, people consume equal amounts of cotton and wheat.) Again, before any trade takes place, each country is constrained by its own domestic production possibility curve.

<table>
<thead>
<tr>
<th>TABLE 34.6 Total Production of Wheat and Cotton Assuming No Trade and 100 Available Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Zealand</td>
</tr>
<tr>
<td>Wheat</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Cotton</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Imagine we are at a meeting of trade representatives of both countries. As a special adviser, David Ricardo is asked to demonstrate that trade can benefit both countries. He divides his demonstration into three stages, which you can follow in Table 34.7. For Ricardo to be correct about the gains from specialization, it must be true that moving resources around in the two countries generates more than the 375 bushels of wheat and bales of cotton that we had before specialization. To see how this is managed, we move in stages.

<table>
<thead>
<tr>
<th>TABLE 34.7 Realizing a Gain from Trade When One Country Has a Double Absolute Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAGE 1</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>New Zealand</td>
</tr>
<tr>
<td>Wheat</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Cotton</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

STAGE 3

<table>
<thead>
<tr>
<th>New Zealand</th>
<th>Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>350 bushels (trade)</td>
</tr>
<tr>
<td>Cotton</td>
<td>350 bales (trade)</td>
</tr>
</tbody>
</table>
In Stage 1, let Australia move all its land into cotton production, where it is least disadvantaged. Australia would then produce 300 bales of cotton, as we see Stage 1 of Table 34.7. Now the question is whether Ricardo can help us use New Zealand’s land to add at least 75 bales of cotton to the total while producing more than the original 375 bushels of wheat. In Stage 2, Ricardo tells New Zealand to use 25 acres to produce cotton and 75 acres for wheat production. With that allocation of land, New Zealand produces 450 bushels of wheat (far more than the total produced in the nonspecialization case by both countries) and 150 bales of cotton, leaving us with 450 bales of cotton as well. Specialization has increased the world production of both wheat and cotton by 75 units! With trade, which we show in Stage 3 for the case in which both countries prefer equal consumption of the two goods, both countries can be better off than they were earlier.

**Why Does Ricardo’s Plan Work?** To understand why Ricardo’s scheme works, let us return to the definition of comparative advantage.

The real cost of producing cotton is the wheat that must be sacrificed to produce it. When we think of cost this way, it is less costly to produce cotton in Australia than to produce it in New Zealand, even though an acre of land produces more cotton in New Zealand. Consider the “cost” of 3 bales of cotton in the two countries. In terms of opportunity cost, 3 bales of cotton in New Zealand cost 3 bushels of wheat; in Australia, 3 bales of cotton cost only 1 bushel of wheat. Because 3 bales are produced by 1 acre of Australian land, to get 3 bales, an Australian must transfer 1 acre of land from wheat to cotton production. Because an acre of land produces a bushel of wheat, losing 1 acre to cotton implies the loss of 1 bushel of wheat. Australia has a comparative advantage in cotton production because its opportunity cost, in terms of wheat, is lower than New Zealand’s. This is illustrated in Figure 34.3.

Conversely, New Zealand has a comparative advantage in wheat production. A unit of wheat in New Zealand costs 1 unit of cotton, while a unit of wheat in Australia costs 3 units of cotton. When countries specialize in producing goods in which they have a comparative advantage, they maximize their combined output and allocate their resources more efficiently.

**Terms of Trade**

Ricardo might suggest a number of options for exchanging wheat and cotton to the trading partners. The one we just examined benefited both partners; in percentage terms, Australia made out slightly better. Other deals might have been more advantageous to New Zealand.

The ratio at which a country can trade domestic products for imported products is the terms of trade. The terms of trade determine how the gains from trade are distributed among trading partners. In the case just considered, the agreed-to terms of trade were 1 bushel of wheat for 2 bales of cotton. Such terms of trade benefit New Zealand, which can get 2 bales of cotton for each bushel of wheat. If it were to transfer its own land from wheat to cotton, it would get only 1 bale of cotton. The same terms of trade benefit Australia, which can get 1 bushel of wheat for 2 bales of cotton. A direct transfer of its own land would force it to give up 3 bales of cotton for 1 bushel of wheat.

![FIGURE 34.3](#)  
**Comparative Advantage Means Lower Opportunity Cost**

The real cost of cotton is the wheat sacrificed to obtain it. The cost of 3 bales of cotton in New Zealand is 3 bushels of wheat (a half acre of land must be transferred from wheat to cotton—refer to Table 34.5). However, the cost of 3 bales of cotton in Australia is only 1 bushel of wheat. Australia has a comparative advantage over New Zealand in cotton production, and New Zealand has a comparative advantage over Australia in wheat production.
If the terms of trade changed to 3 bales of cotton for every bushel of wheat, only New Zealand would benefit. At those terms of trade, all the gains from trade would flow to New Zealand. Such terms do not benefit Australia at all because the opportunity cost of producing wheat domestically is exactly the same as the trade cost: A bushel of wheat costs 3 bales of cotton. If the terms of trade went the other way—1 bale of cotton for each bushel of wheat—all Australia would benefit. New Zealand gains nothing because it can already substitute cotton for wheat at that ratio. To get a bushel of wheat domestically, however, Australia must give up 3 bales of cotton, and one-for-one terms of trade would make wheat much less costly for Australia.

Both parties must have something to gain for trade to take place. In this case, you can see that both Australia and New Zealand will gain when the terms of trade are set between 1:1 and 3:1, cotton to wheat.

**Exchange Rates**

The examples used thus far have shown that trade can result in gains to both parties. When trade is free—unimpeded by government-instituted barriers—patterns of trade and trade flows result from the independent decisions of thousands of importers and exporters and millions of private households and firms.

Private households decide whether to buy Toyotas or Chevrolets, and private firms decide whether to buy machine tools made in the United States or machine tools made in Taiwan, raw steel produced in Germany or raw steel produced in Pittsburgh.

But how does this trade actually come about? Before a citizen of one country can buy a product made in another country or sold by someone in another country, a currency swap must take place. Consider Shane, who buys a Toyota from a dealer in Boston. He pays in dollars, but the Japanese workers who made the car receive their salaries in yen. Somewhere between the buyer of the car and the producer, a currency exchange must be made. The regional distributor probably takes payment in dollars and converts them into yen before remitting the proceeds to Japan.

To buy a foreign-produced good, a consumer, or an intermediary, has to buy foreign currency. The price of Shane’s Toyota in dollars depends on the price of the car stated in yen and the dollar price of yen. You probably know the ins and outs of currency exchange very well if you have ever traveled in another country.

In June 2010, the British pound was worth $1.48. Now suppose you are in London having dinner. On the menu is a nice bottle of wine for 15 pounds. How can you figure out whether you want to buy it? You know what dollars will buy in the United States, so you have to convert the price into dollars. Each pound will cost you $1.48, so 15 pounds will cost you $1.48 \times 15 = $22.20.

The attractiveness of foreign goods to U.S. buyers and of U.S. goods to foreign buyers depends in part on the exchange rate, the ratio at which two currencies are traded. In May 2008, the British pound was worth $1.97, and that same bottle of wine would have cost $29.55.

To understand the patterns of trade that result from the actions of hundreds of thousands of independent buyers and sellers—households and firms—we must know something about the factors that determine exchange rates. Exchange rate determination is very complicated. Here, however, we can demonstrate two things. First, for any pair of countries, there is a range of exchange rates that can lead automatically to both countries’ realizing the gains from specialization and comparative advantage. Second, within that range, the exchange rate will determine which country gains the most from trade. In short, exchange rates determine the terms of trade.

**Trade and Exchange Rates in a Two-Country/Two-Good World** Consider first a simple two-country/two-good model. Suppose both the United States and Brazil produce only two goods—raw timber and rolled steel. Table 34.8 gives the current prices of both goods as domestic buyers see them. In Brazil, timber is priced at 3 reals (R) per foot and steel is priced at 4 R per meter. In the United States, timber costs $1 per foot and steel costs $2 per meter.

<table>
<thead>
<tr>
<th></th>
<th>United States</th>
<th>Brazil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber</td>
<td>$1</td>
<td>3 Reals</td>
</tr>
<tr>
<td>Rolled steel</td>
<td>$2</td>
<td>4 Reals</td>
</tr>
</tbody>
</table>
Suppose U.S. and Brazilian buyers have the option of buying at home or importing to meet their needs. The options they choose will depend on the exchange rate. For the time being, we will ignore transportation costs between countries and assume that Brazilian and U.S. products are of equal quality.

Let us start with the assumption that the exchange rate is $1 = 1 R$. From the standpoint of U.S. buyers, neither Brazilian steel nor Brazilian timber is competitive at this exchange rate. A dollar buys a foot of timber in the United States, but if converted into a real, it will buy only one-third of a foot. The price of Brazilian timber to an American is $3 because it will take $3 to buy the necessary 3 R. Similarly, $2 buys a meter of rolled steel in the United States, but the same $2 buys only half a meter of Brazilian steel. The price of Brazilian steel to an American is $4, twice the price of domestically produced steel.

At this exchange rate, however, Brazilians find that U.S.-produced steel and timber are less expensive than steel and timber produced in Brazil. Timber at home—Brazil—costs 3 R, but 3 R buys $3, which buys 3 times as much timber in the United States. Similarly, steel costs 4 R at home, but 4 R buys $4, which buys twice as much U.S.-made steel. At an exchange rate of $1 = 1 R, Brazil will import steel and timber and the United States will import nothing.

However, now suppose the exchange rate is 1 R = $0.25. This means that 1 dollar buys 4 R. At this exchange rate, the Brazilians buy timber and steel at home and the Americans import both goods. At this exchange rate, Americans must pay a dollar for a foot of U.S. timber, but the same amount of timber can be had in Brazil for the equivalent of $0.75. (Because 1 R costs $0.25, 3 R can be purchased for $0.75.) Similarly, steel that costs $2 per meter in the United States costs an American half as much in Brazil because $2 buys 8 R, which buys 2 meters of Brazilian steel. At the same time, Brazilians are not interested in importing because both goods are cheaper when purchased from a Brazilian producer. In this case, the United States imports both goods and Brazil imports nothing.

So far we can see that at exchange rates of $1 = 1 R and $1 = 4 R, we get trade flowing in only one direction. Let us now try an exchange rate of $1 = 2 R, or 1 R = $0.50. First, Brazilians will buy timber in the United States. Brazilian timber costs 3 R per foot, but 3 R buys $1.50, which is enough to buy 1.5 feet of U.S. timber. Buyers in the United States will find Brazilian timber too expensive, but Brazil will import timber from the United States. At this same exchange rate, however, both Brazilian and U.S. buyers will be indifferent between Brazilian and U.S. steel. To U.S. buyers, domestically produced steel costs $2. Because $2 buys 4 R, a meter of imported Brazilian steel also costs $2. Brazilian buyers also find that steel costs 4 R, whether domestically produced or imported. Thus, there is likely to be no trade in steel.

What happens if the exchange rate changes so that $1 buys 2.1 R? While U.S. timber is still cheaper to both Brazilians and Americans, Brazilian steel begins to look good to U.S. buyers. Steel produced in the United States costs $2 per meter, but $2 buys 4.2 R, which buys more than a meter of steel in Brazil. When $1 buys more than 2 R, trade begins to flow in both directions: Brazil will import timber, and the United States will import steel.

If you examine Table 34.9 carefully, you will see that trade flows in both directions as long as the exchange rate settles between $1 = 2 R and $1 = 3 R. Stated the other way around, trade will flow in both directions if the price of a real is between $0.33 and $0.50.

<table>
<thead>
<tr>
<th>Exchange Rate</th>
<th>Price of Real</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1 = 1 R</td>
<td>$ 1.00</td>
<td>Brazil imports timber and steel.</td>
</tr>
<tr>
<td>$1 = 2 R</td>
<td>.50</td>
<td>Brazil imports timber.</td>
</tr>
<tr>
<td>$1 = 2.1 R</td>
<td>.48</td>
<td>Brazil imports timber; United States imports steel.</td>
</tr>
<tr>
<td>$1 = 2.9 R</td>
<td>.34</td>
<td>Brazil imports timber; United States imports steel.</td>
</tr>
<tr>
<td>$1 = 3 R</td>
<td>.33</td>
<td>United States imports steel.</td>
</tr>
<tr>
<td>$1 = 4 R</td>
<td>.25</td>
<td>United States imports timber and steel.</td>
</tr>
</tbody>
</table>

**Exchange Rates and Comparative Advantage** If the foreign exchange market drives the exchange rate to anywhere between 2 and 3 R per dollar, the countries will automatically adjust and comparative advantage will be realized. At these exchange rates, U.S. buyers...
begin buying all their steel in Brazil. The U.S. steel industry finds itself in trouble. Plants close, and U.S. workers begin to lobby for tariff protection against Brazilian steel. At the same time, the U.S. timber industry does well, fueled by strong export demand from Brazil. The timber-producing sector expands. Resources, including capital and labor, are attracted into timber production.

The opposite occurs in Brazil. The Brazilian timber industry suffers losses as export demand dries up and Brazilians turn to cheaper U.S. imports. In Brazil, lumber companies turn to the government and ask for protection from cheap U.S. timber. However, steel producers in Brazil are happy. They are not only supplying 100 percent of the domestically demanded steel but also selling to U.S. buyers. The steel industry expands, and the timber industry contracts. Resources, including labor, flow into steel.

With this expansion-and-contraction scenario in mind, let us look again at our original definition of comparative advantage. If we assume that prices reflect resource use and resources can be transferred from sector to sector, we can calculate the opportunity cost of steel/timber in both countries. In the United States, the production of a meter of rolled steel consumes twice the resources that the production of a foot of timber consumes. Assuming that resources can be transferred, the opportunity cost of a meter of steel is 2 feet of timber (Table 34.8). In Brazil, a meter of steel uses resources costing 4 R, while a unit of timber costs 3 R. To produce a meter of steel means the sacrifice of only four-thirds (or one and one-third) feet of timber. Because the opportunity cost of a meter of steel (in terms of timber) is lower in Brazil, we say that Brazil has a comparative advantage in steel production.

Conversely, consider the opportunity cost of timber in the two countries. Increasing timber production in the United States requires the sacrifice of half a meter of steel for every foot of timber—producing a meter of steel uses $2 worth of resources, while producing a foot of timber requires only $1 worth of resources. Nevertheless, each foot of timber production in Brazil requires the sacrifice of three-fourths of a meter of steel. Because the opportunity cost of timber is lower in the United States, the United States has a comparative advantage in the production of timber. If exchange rates end up in the right ranges, the free market will drive each country to shift resources into those sectors in which it enjoys a comparative advantage. Only in a country with a comparative advantage will those products be competitive in world markets.

The Sources of Comparative Advantage

Specialization and trade can benefit all trading partners, even those that may be inefficient producers in an absolute sense. If markets are competitive and if foreign exchange markets are linked to goods-and-services exchange, countries will specialize in producing products in which they have a comparative advantage.

So far, we have said nothing about the sources of comparative advantage. What determines whether a country has a comparative advantage in heavy manufacturing or in agriculture? What explains the actual trade flows observed around the world? Various theories and empirical work on international trade have provided some answers. Most economists look to factor endowments—the quantity and quality of labor, land, and natural resources of a country—as the principal sources of comparative advantage. Factor endowments seem to explain a significant portion of actual world trade patterns.

The Heckscher-Ohlin Theorem

Eli Heckscher and Bertil Ohlin, two Swedish economists who wrote in the first half of the twentieth century, expanded and elaborated on Ricardo’s theory of comparative advantage. The Heckscher-Ohlin theorem ties the theory of comparative advantage to factor endowments. It assumes that products can be produced using differing proportions of inputs and that inputs are mobile between sectors in each economy but that factors are not mobile between economies. According to this theorem, a country has a comparative advantage in the production of a product if that country is relatively well endowed with inputs used intensively in the production of that product.
This idea is simple. A country with a great deal of good fertile land is likely to have a comparative advantage in agriculture. A country with a large amount of accumulated capital is likely to have a comparative advantage in heavy manufacturing. A country well-endowed with human capital is likely to have a comparative advantage in highly technical goods.

Other Explanations for Observed Trade Flows

Comparative advantage is not the only reason countries trade. It does not explain why many countries import and export the same kinds of goods. The United States, for example, exports and imports automobiles.

Just as industries within a country differentiate their products to capture a domestic market, they also differentiate their products to please the wide variety of tastes that exists worldwide. The Japanese automobile industry, for example, began producing small, fuel-efficient cars long before U.S. automobile makers did. In doing so, the Japanese auto industry developed expertise in creating products that attracted a devoted following and considerable brand loyalty. BMWs, made mostly in Germany, and Volvos, made mostly in Sweden, also have their champions in many countries. Just as product differentiation is a natural response to diverse preferences within an economy, it is also a natural response to diverse preferences across economies. Paul Krugman did some of the earliest work in this area, sometimes called New Trade Theory.

New trade theory also relies on the idea of comparative advantage. If the Japanese developed skills and knowledge that gave them an edge in the production of fuel-efficient cars, that knowledge can be thought of as a very specific kind of capital that is not currently available to other producers. The Volvo company invested in a form of intangible capital called goodwill. That goodwill, which may come from establishing a reputation for safety and quality over the years, is one source of the comparative advantage that keeps Volvos selling on the international market. Some economists distinguish between gains from acquired comparative advantages and gains from natural comparative advantages.

Trade Barriers: Tariffs, Export Subsidies, and Quotas

Trade barriers—also called obstacles to trade—take many forms. The three most common are tariffs, export subsidies, and quotas. All are forms of protection shielding some sector of the economy from foreign competition.

A tariff is a tax on imports. The average tariff on imports into the United States is less than 5 percent. Certain protected items have much higher tariffs. For example, in 2009 President Obama imposed a tariff of 35 percent on tire imports from China.

Export subsidies—government payments made to domestic firms to encourage exports—can also act as a barrier to trade. One of the provisions of the Corn Laws that stimulated Ricardo’s musings was an export subsidy automatically paid to farmers by the British government when the price of grain fell below a specified level. The subsidy served to keep domestic prices high, but it flooded the world market with cheap subsidized grain. Foreign farmers who were not subsidized were driven out of the international marketplace by the artificially low prices.

Farm subsidies remain a part of the international trade landscape today. Many countries continue to appease their farmers by heavily subsidizing exports of agricultural products. The political power of the farm lobby in many countries has had an important effect on recent international trade negotiations aimed at reducing trade barriers. The prevalence of farm subsidies in the developed world has become a major rallying point for less developed countries as they strive to compete in the global marketplace. Many African nations, in particular, have a comparative advantage in agricultural land. In producing agricultural goods for export to the world marketplace, however, they must compete with food produced on heavily subsidized farms in Europe and the United States. Countries such as France have particularly high farm subsidies,
which, it argues, helps preserve the rural heritage of France. One side effect of these subsidies, however, is to make it more difficult for some of the poorer nations in the world to compete. Some have argued that if developed nations eliminated their farm subsidies, this would have a much larger effect on the economies of some African nations than is currently achieved by charitable aid programs.

Closely related to subsidies is dumping. Dumping occurs when a firm or industry sells its products on the world market at prices lower than its cost of production. Charges of dumping are often brought by a domestic producer that believes itself to be subject to unfair competition. In the United States, claims of dumping are brought before the International Trade Commission. In 2007, for example, a small manufacturer of thermal paper charged China and Germany with dumping. In 2006, the European Union charged China with dumping shoes. In 2009, China brought a dumping charge against U.S. chicken producers. Determining whether dumping has actually occurred can be difficult. Domestic producers argue that foreign firms will dump their product in the United States, drive out American competitors, and then raise prices, thus harming consumers. Foreign exporters, on the other hand, claim that their prices are low simply because their costs are low and that no dumping has occurred. Figuring out the costs for German thermal paper or Chinese shoes is not easy. In the case of the Chinese shoe claim, for example, the Chinese government pointed out that shoes are a very labor-intensive product and that given China’s low wages, it should not be a surprise that it is able to produce shoes very cheaply. In other words, the Chinese claim that shoes are an example of the theory of comparative advantage at work rather than predatory dumping.

A quota is a limit on the quantity of imports. Quotas can be mandatory or voluntary, and they may be legislated or negotiated with foreign governments. The best-known voluntary quota, or “voluntary restraint,” was negotiated with the Japanese government in 1981. Japan agreed to reduce its automobile exports to the United States by 7.7 percent, from the 1980 level of 1.82 million units to 1.68 million units. Many quotas limit trade around the world today. Perhaps the best-known recent case is the textile quota imposed in August 2005 by the European Union on imports of textiles from China. Because China had exceeded quotas that had been agreed to earlier in the year, the EU blocked the entry of Chinese-produced textiles into Europe; as a result, more than 100 million garments piled up in European ports.

### U.S. Trade Policies, GATT, and the WTO

The United States has been a high-tariff nation, with average tariffs of over 50 percent, for much of its history. The highest were in effect during the Great Depression following the Smoot-Hawley tariff, which pushed the average tariff rate to 60 percent in 1930. The Smoot-Hawley tariff set off an international trade war when U.S. trading partners retaliated with tariffs of their own. Many economists say the decline in trade that followed was one of the causes of the worldwide depression of the 1930s.

In 1947, the United States, with 22 other nations, agreed to reduce barriers to trade. It also established an organization to promote liberalization of foreign trade. The General Agreement on Tariffs and Trade (GATT) proved to be very successful in helping reduce tariff levels and encouraging trade. In 1986, GATT sponsored a round of world trade talks known as the Uruguay Round that were focused on reducing trade barriers further. After much debate, the Uruguay Round was signed by the U.S. Congress in 1993 and became a model for multilateral trade agreements.

In 1995, the World Trade Organization (WTO) was established as a negotiating forum to deal with the rules of trade established under GATT and other agreements. It remains the key institution focused on facilitating freer trade across nations and negotiating trade disputes. The WTO consists of 153 member nations and serves as a negotiating forum for countries as they work through complexities of trade under the Uruguay Round and other agreements. At this time, the WTO is the central institution for promoting and facilitating free trade.

While the WTO was founded to promote free trade, its member countries clearly have different incentives as they confront trade cases. In recent years, differences between developed and developing countries have come to the fore. In 2001, at a WTO meeting in Doha, Qatar, the WTO launched a new initiative, the Doha Development Agenda, to deal with some of the issues that intersect the areas of trade and development. In 2007, the Doha Development Agenda continued to struggle over

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the issue of agriculture and farm subsidies that were described earlier in this chapter. The less developed countries, with sub-Saharan Africa taking the lead, seek to eliminate all farm subsidies currently paid by the United States and the European Union. The EU has, for its part, tried to push the less developed countries toward better environmental policies as part of a broader free trade package. As of 2010, the Doha declaration remained stalled.

The movement in the United States has been away from tariffs and quotas and toward freer trade. The Reciprocal Trade Agreements Act of 1934 authorized the president to negotiate trade agreements on behalf of the United States. As part of trade negotiations, the president can confer most-favored-nation status on individual trading partners. Imports from countries with most-favored-nation status are taxed at the lowest negotiated tariff rates. In addition, in recent years, several successful rounds of tariff-reduction negotiations have reduced trade barriers to their lowest levels ever.

Despite this general trend toward freer trade, most American presidents in the last 50 years have made exceptions to protect one economic sector or another. Eisenhower and Kennedy restricted imports of Japanese textiles; Johnson restricted meat imports to protect Texas beef producers; Nixon restricted steel imports; Reagan restricted automobiles from Japan. In early 2002, President George W. Bush imposed a 30 percent tariff on steel imported from the EU. In 2003, the WTO ruled that these tariffs were unfair and allowed the EU to slap retaliatory tariffs on U.S. products. Shortly thereafter, the steel tariffs were rolled back, at least on EU steel. At present, the United States has high tariffs on sugar-based ethanol, an energy source competitive with corn-based ethanol, and on tires imported from China.

**Economic Integration**

**Economic integration** occurs when two or more nations join to form a free-trade zone. In 1991, the European Community (EC, or the Common Market) began forming the largest free-trade zone in the world. The economic integration process began that December, when the 12 original members (the United Kingdom, Belgium, France, Germany, Italy, the Netherlands, Luxembourg, Denmark, Greece, Ireland, Spain, and Portugal) signed the Maastricht Treaty. The treaty called for the end of border controls, a common currency, an end to all tariffs, and the coordination of monetary and political affairs. The **European Union (EU)**, as the EC is now called, has 27 members (for a list, see the Summary, p. 683). On January 1, 1993, all tariffs and trade barriers were dropped among the member countries. Border checkpoints were closed in early 1995. Citizens can now travel among member countries without passports.

The United States is not a part of the EU. However, in 1988, the United States (under President Reagan) and Canada (under Prime Minister Mulroney) signed the **U.S.-Canadian Free Trade Agreement**, which removed all barriers to trade, including tariffs and quotas, between the two countries in 1998.

During the last days of the George H. W. Bush administration in 1992, the United States, Mexico, and Canada signed the **North American Free Trade Agreement (NAFTA)**, with the three countries agreeing to establish all of North America as a free-trade zone. The agreement eliminated all tariffs over a 10- to 15-year period and removed restrictions on most investments. During the presidential campaign of 1992, NAFTA was hotly debated. Both Bill Clinton and George Bush supported the agreement. Industrial labor unions that might be affected by increased imports from Mexico (such as those in the automobile industry) opposed the agreement, while industries whose exports to Mexico might increase as a result of the agreement—for example, the machine tool industry—supported it. Another concern was that Mexican companies were not subject to the same environmental regulations as U.S. firms, so U.S. firms might move to Mexico for this reason.

NAFTA was ratified by the U.S. Congress in late 1993 and went into effect on the first day of 1994. The U.S. Department of Commerce estimated that as a result of NAFTA, trade between the United States and Mexico increased by nearly $16 billion in 1994. In addition, exports from the United States to Mexico outpaced imports from Mexico during 1994. In 1995, however, the agreement fell under the shadow of a dramatic collapse of the value of the peso. U.S. exports to Mexico dropped sharply, and the United States shifted from a trade surplus to a large trade deficit with Mexico. Aside from a handful of tariffs, however, all of NAFTA’s commitments were fully implemented by 2003, and an 8-year report signed by all three countries declared the pact a success. The report concludes, “Eight years of expanded trade, increased employment and investment, and enhanced opportunity for the citizens of all three countries have demonstrated that NAFTA works and will continue to work.” In 2007, trade among the NAFTA nations reached $930 billion.
ECONOMICS IN PRACTICE

Tariff Wars

In the recent recession we have again seen political pressure aimed at imposing tariffs. These pressures have been especially strong in the case of China, whose export growth to the United States and the EU has been very strong. In the case of the EU’s tariff on Chinese shoes, pressure from Italian shoemakers played a substantial role.

China Complains to WTO About EU Tariffs

The Wall Street Journal

China filed a complaint against European Union shoe tariffs at the World Trade Organization on Thursday, as Beijing continued its legal assault on what it says is unfair Western protectionism.

China’s exports have been growing since the 1990s, particularly after the country joined the WTO in 2001. Eight years later, China passed Germany to become the world’s top exporter. That status comes with a price: China is now the leading target for protectionist measures, according to Global Trade Alert, an independent monitor.

As the fitful economic recovery has put some domestic jobs and profits at risk, the EU and the U.S. have sought to stem the flow of Chinese imports with special duties. Added to existing tariffs, the duties are meant to make Chinese goods too expensive for consumers to afford.

China isn’t taking the restrictions lying down. From a new office near WTO headquarters in Geneva, Beijing is playing hardball. It is paying top dollar to engage premium counsel, some trade lawyers say.

In September, China reacted to President Barack Obama’s tariffs on tire imports with a complaint against the U.S. China has also put restrictions on imports of U.S. poultry and auto parts.

Early Friday, China’s Commerce Ministry said it had made a preliminary decision to impose antidumping duties on some U.S. chicken products from Feb. 13, the eve of the Lunar New Year, China’s biggest holiday. Companies named in the statement include Pilgrim’s Pride and Tyson Foods Inc. In the EU case, China is taking on one of the most important tariff increases ever levied, which has taken a bite out of its expansive shoe industry. The 16.5% tariffs are antidumping duties, meant to punish goods that are sold below cost and hurt the sales of domestic producers.

The EU duties were inaugurated in 2006 and extended for 15 months in December 2009. At the same time, shoe imports from Vietnam were hit with a 10% tariff.

The EU tariffs were passed after fierce lobbying by Italy on behalf of its domestic shoemakers. Italy traded votes in other debates with EU members in exchange for support for the tariffs, EU officials say.


Free Trade or Protection?

One of the great economic debates of all time revolves around the free-trade-versus-protection controversy. We briefly summarize the arguments in favor of each.

The Case for Free Trade

In one sense, the theory of comparative advantage is the case for free trade. Trade has potential benefits for all nations. A good is not imported unless its net price to buyers is below the net price of the domestically produced alternative. When the Brazilians in our earlier example found U.S. timber less expensive than their own, they bought it, yet they continued to pay the same price for homemade steel. Americans bought less expensive Brazilian steel, but they continued to buy domestic timber at the same lower price. Under these conditions, both Americans and Brazilians ended up paying less and consuming more.

At the same time, resources (including labor) move out of steel production and into timber production in the United States. In Brazil, resources (including labor) move out of timber production and into steel production. The resources in both countries are used more efficiently.
Tariffs, export subsidies, and quotas, which interfere with the free movement of goods and services around the world, reduce or eliminate the gains of comparative advantage.

We can use supply and demand curves to illustrate this. Suppose Figure 34.4 shows domestic supply and demand for textiles. In the absence of trade, the market clears at a price of $4.20. At equilibrium, 450 million yards of textiles are produced and consumed.

Assume now that textiles are available at a world price of $2. This is the price in dollars that Americans must pay for textiles from foreign sources. If we assume that an unlimited quantity of textiles is available at $2 and there is no difference in quality between domestic and foreign textiles, no domestic producer will be able to charge more than $2. In the absence of trade barriers, the world price sets the price in the United States. As the price in the United States falls from $4.20 to $2.00, the quantity demanded by consumers increases from 450 million yards to 700 million yards, but the quantity supplied by domestic producers drops from 450 million yards to 200 million yards. The difference, 500 million yards, is the quantity of textiles imported.

The argument for free trade is that each country should specialize in producing the goods and services in which it enjoys a comparative advantage. If foreign producers can produce textiles at a much lower price than domestic producers, they have a comparative advantage. As the world price of textiles falls to $2, domestic (U.S.) quantity supplied drops and resources are transferred to other sectors. These other sectors, which may be export industries or domestic industries, are not shown in Figure 34.4a. It is clear that the allocation of resources is more efficient at a price of $2. Why should the United States use domestic resources to produce what foreign producers can produce at a lower cost? U.S. resources should move into the production of the things it produces best.

Now consider what happens to the domestic price of textiles when a trade barrier is imposed. Figure 34.4b shows the effect of a set tariff of $1 per yard imposed on imported textiles. The tariff raises the domestic price of textiles to $2 + $1 = $3. The result is that some of the gains from trade are lost. First, consumers are forced to pay a higher price for the same good. The quantity of

![Figure 34.4 The Gains from Trade and Losses from the Imposition of a Tariff](image)

\textbf{FIGURE 34.4 The Gains from Trade and Losses from the Imposition of a Tariff}

A tariff of $1 increases the market price facing consumers from $2 per yard to $3 per yard. The government collects revenues equal to the gray shaded area in b. The loss of efficiency has two components. First, consumers must pay a higher price for goods that could be produced at lower cost. Second, marginal producers are drawn into textiles and away from other goods, resulting in inefficient domestic production. The triangle labeled ABC in b is the dead weight loss or excess burden resulting from the tariff.
textiles demanded drops from 700 million yards under free trade to 600 million yards because some consumers are not willing to pay the higher price. Notice in Figure 34.4b the triangle labeled ABC. This is the deadweight loss or excess burden resulting from the tariff. Absent the tariff, these 100 added units of textiles would have generated benefits in excess of the $2 that each one cost.

At the same time, the higher price of textiles draws some marginal domestic producers who could not make a profit at $2 into textile production. (Recall that domestic producers do not pay a tariff.) As the price rises to $3, the quantity supplied by domestic producers rises from 200 million yards to 300 million yards. The result is a decrease in imports from 500 million yards to 300 million yards.

Finally, the imposition of the tariff means that the government collects revenue equal to the shaded area in Figure 34.4b. This shaded area is equal to the tariff rate per unit ($1) times the number of units imported after the tariff is in place (300 million yards). Thus, receipts from the tariff are $300 million.

What is the final result of the tariff? Domestic producers receiving revenues of only $2 per unit before the tariff was imposed now receive a higher price and earn higher profits. However, these higher profits are achieved at a loss of efficiency. Trade barriers prevent a nation from reaping the benefits of specialization, push it to adopt relatively inefficient production techniques, and force consumers to pay higher prices for protected products than they would otherwise pay.

The Case for Protection

A case can also be made in favor of tariffs and quotas. Over the course of U.S. history, protectionist arguments have been made so many times by so many industries before so many congressional committees that it seems all pleas for protection share the same themes. We describe the most frequently heard pleas next.

Protection Saves Jobs

The main argument for protection is that foreign competition costs Americans their jobs. When Americans buy imported Toyotas, U.S. produced cars go unsold. Layoffs in the domestic auto industry follow. When Americans buy Chinese textiles, American workers may lose their jobs. When Americans buy shoes or textiles from Korea or Taiwan, the millworkers in Maine and Massachusetts, as well as in South Carolina and Georgia, lose their jobs.

It is true that when we buy goods from foreign producers, domestic producers suffer. However, there is no reason to believe that the workers laid off in the contracting sectors will not ultimately be reemployed in expanding sectors. Foreign competition in textiles, for example, has meant the loss of U.S. jobs in that industry. Thousands of textile workers in New England lost their jobs as the textile mills closed over the last 40 years. Nevertheless, with the expansion of high-tech industries, the unemployment rate in Massachusetts fell to one of the lowest in the country in the mid-1980s, and New Hampshire, Vermont, and Maine also boomed. By the 1990s, New England had suffered another severe downturn, due partly to high-technology hardware manufacturing that had moved abroad. But by the late 1990s, its economy was booming again, this time on the back of what was called a “New Industrial Revolution”: the rise of Internet-based business.

The adjustment is far from costless. The knowledge that some other industry, perhaps in some other part of the country, may be expanding is of little comfort to the person whose skills become obsolete or whose pension benefits are lost when his or her company abruptly closes a plant or goes bankrupt. The social and personal problems brought about by industry-specific unemployment, obsolete skills, and bankruptcy as a result of foreign competition are significant.

These problems can be addressed in two ways. We can ban imports and give up the gains from free trade, acknowledging that we are willing to pay premium prices to save domestic jobs in industries that can produce more efficiently abroad, or we can aid the victims of free trade in a constructive way, helping to retrain them for jobs with a future. In some instances, programs to relocate people in expanding regions may be in order. Some programs deal directly with the transition without forgoing the gains from trade.
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ECONOMICS IN PRACTICE

A Petition

While most economists argue in favor of free trade, it is important to recognize that some groups are likely to lose from freer trade. Arguments by the losing groups against trade have been around for hundreds of years. In the following article, you will find an essay by a French satirist of the nineteenth century, Frederic Bastiat, complaining about the unfair competition that the sun provides to candle makers. You see that the author proposes a quota, as opposed to a tariff, on the sun.

From the Manufacturers of Candles, Tapers, Lanterns, Sticks, Street Lamps, Snuffers, and Extinguishers, and from Producers of Tallow, Oil, Resin, Alcohol, and Generally of Everything Connected with Lighting.

To the Honourable Members of the Chamber of Deputies.

Gentlemen:

You are on the right track. You reject abstract theories and [have] little regard for abundance and low prices. You concern yourselves mainly with the fate of the producer. You wish to free him from foreign competition, that is, to reserve the domestic market for domestic industry.

We come to offer you a wonderful opportunity for your—what shall we call it? Your theory? No, nothing is more deceptive than theory. Your doctrine? Your system? Your principle? But you dislike doctrines, you have a horror of systems, as for principles, you deny that there are any in political economy; therefore we shall call it your practice—your practice without theory and without principle.

We are suffering from the ruinous competition of a rival who apparently works under conditions so far superior to our own for the production of light that he is flooding the domestic market with it at an incredibly low price; for the moment he appears, our sales cease, all the consumers turn to him, and a branch of French industry whose ramifications are innumerable is all at once reduced to complete stagnation. This rival, which is none other than the sun, is waging war on us so mercilessly we suspect he is being stirred up against us by perfidious Albion (excellent diplomacy nowadays!), particularly because he has for that haughty island a respect that he does not show for us. [A reference to Britain's reputation as a foggy island.]

We ask you to be so good as to pass a law requiring the closing of all windows, dormers, skylights, inside and outside shutters, curtains, casements, bull's-eyes, deadlights, and blinds—in short, all openings, holes, chinks, and fissures through which the light of the sun is wont to enter houses, to the detriment of the fair industries with which, we are proud to say, we have endowed the country, a country that cannot, without betraying ingratitude, abandon us today to so unequal a combat.


Some Countries Engage in Unfair Trade Practices  Attempts by U.S. firms to monopolize an industry are illegal under the Sherman and Clayton acts. If a strong company decides to drive the competition out of the market by setting prices below cost, it would be aggressively prosecuted by the Antitrust Division of the Justice Department. However, the argument goes, if we will not allow a U.S. firm to engage in predatory pricing or monopolize an industry or a market, can we stand by and let a German firm or a Japanese firm do so in the name of free trade? This is a legitimate argument and one that has gained significant favor in recent years. How should we respond when a large international company or a country behaves strategically against a domestic firm or industry? Free trade may be the best solution when everybody plays by the rules, but sometimes we have to fight back. The WTO is the vehicle currently used to negotiate disputes of this sort.
Cheap Foreign Labor Makes Competition Unfair  Let us say that a particular country gained its “comparative advantage” in textiles by paying its workers low wages. How can U.S. textile companies compete with companies that pay wages that are less than a quarter of what U.S. companies pay? Questions like this are often asked by those concerned with competition from China and India.

First, remember that wages in a competitive economy reflect productivity: a high ratio of output to units of labor. Workers in the United States earn higher wages because they are more productive. The United States has more capital per worker; that is, the average worker works with better machinery and equipment and its workers are better trained. Second, trade flows not according to absolute advantage, but according to comparative advantage: All countries benefit, even if one country is more efficient at producing everything.

Protection Safeguards National Security  Beyond saving jobs, certain sectors of the economy may appeal for protection for other reasons. The steel industry has argued for years with some success that it is vital to national defense. In the event of a war, the United States would not want to depend on foreign countries for a product as vital as steel. Even if we acknowledge another country’s comparative advantage, we may want to protect our own resources.

Virtually no industry has ever asked for protection without invoking the national defense argument. Testimony that was once given on behalf of the scissors and shears industry argued that “in the event of a national emergency and imports cutoff, the United States would be without a source of scissors and shears, basic tools for many industries and trades essential to our national defense.” The question lies not in the merit of the argument, but in just how seriously it can be taken if every industry uses it.

Protection Discourages Dependency  Closely related to the national defense argument is the claim that countries, particularly small or developing countries, may come to rely too heavily on one or more trading partners for many items. If a small country comes to rely on a major power for food or energy or some important raw material in which the large nation has a comparative advantage, it may be difficult for the smaller nation to remain politically neutral. Some critics of free trade argue that larger countries, such as the United States, Russia, and China have consciously engaged in trade with smaller countries to create these kinds of dependencies.

Therefore, should small, independent countries consciously avoid trading relationships that might lead to political dependence? This objective may involve developing domestic industries in areas where a country has a comparative disadvantage. To do so would mean protecting that industry from international competition.

Environmental Concerns  In recent years, concern about the environment has led some people to question advantages of free trade. Some environmental groups, for example, argue that the WTO’s free trade policies may harm the environment. The central argument is that poor countries will become havens for polluting industries that will operate their steel and auto factories with few environmental controls.

These issues are quite complex, and there is much dispute among economists about the interaction between free trade and the environment. One relatively recent study of sulphur dioxide, for example, found that in the long run, free trade reduces pollution, largely by increasing the income of countries; richer countries typically choose policies to improve the environment. Thus, while free trade and increased development initially may cause pollution levels to rise, in the long run, prosperity is a benefit to the environment. Many also argue that there are complex trade-offs to be made between pollution control and problems such as malnutrition and health for poor countries. The United States and Europe both traded off faster economic growth and income against cleaner air and water at earlier times in their development. Some argue that it is unfair for the developed countries to impose their preferences on other countries facing more difficult trade-offs.

Nevertheless, the concern with global climate change has stimulated new thinking in this area. A recent study by the Tyndall Centre for Climate Change Research in Britain found that in 2004, 23 percent of the greenhouse gas emissions produced by China were created in the production of...
exports. In other words, these emissions come not as a result of goods that China’s population is enjoying as its income rises, but as a consequence of the consumption of the United States and Europe, where most of these goods are going. In a world in which the effects of carbon emissions are global and all countries are not willing to sign binding global agreements to control emissions, trade with China may be a way for developed nations to avoid their commitments to pollution reduction. Some have argued that penalties could be imposed on high-polluting products produced in countries that have not signed international climate control treaties as a way to ensure that the prices of goods imported this way reflect the harm that those products cause the environment.3 Implementing these policies is, however, likely to be very complex, and some have argued that it is a mistake to bundle trade and environmental issues. As with other areas covered in this book, there is still disagreement among economists as to the right answer.

Protection Safeguards Infant Industries  Young industries in a given country may have a difficult time competing with established industries in other countries. In a dynamic world, a protected infant industry might mature into a strong industry worldwide because of an acquired, but real, comparative advantage. If such an industry is undercut and driven out of world markets at the beginning of its life, that comparative advantage might never develop.

Yet efforts to protect infant industries can backfire. In July 1991, the U.S. government imposed a 62.67 percent tariff on imports of active-matrix liquid crystal display screens (also referred to as “flat-panel displays” used primarily for laptop computers) from Japan. The Commerce Department and the International Trade Commission agreed that Japanese producers were selling their screens in the U.S. market at a price below cost and that this dumping threatened the survival of domestic laptop screen producers. The tariff was meant to protect the infant U.S. industry until it could compete head-on with the Japanese.

Unfortunately for U.S. producers of laptop computers and for consumers who purchase them, the tariff had an unintended (although predictable) effect on the industry. Because U.S. laptop screens were generally recognized to be of lower quality than their Japanese counterparts, imposition of the tariff left U.S. computer manufacturers with three options: (1) They could use the screens available from U.S. producers and watch sales of their final product decline in the face of higher-quality competition from abroad, (2) they could pay the tariff for the higher-quality screens and watch sales of their final product decline in the face of lower-priced competition from abroad, or (3) they could do what was most profitable for them to do—move their production facilities abroad to avoid the tariff completely. The last option is what Apple and IBM did. In the end, not only were the laptop industry and its consumers hurt by the imposition of the tariff (due to higher costs of production and to higher laptop computer prices), but the U.S. screen industry was hurt as well (due to its loss of buyers for its product) by a policy specifically designed to help it.

The case for free trade has been made across the world as increasing numbers of countries have joined the world marketplace. Figure 34.5 traces the path of tariffs across the world from

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PART VII
The World Economy

1. All economies, regardless of their size, depend to some extent on other economies and are affected by events outside their borders.

TRADE SURPLUSES AND DEFICITS p. 664

2. Until the 1970s, the United States generally exported more than it imported—it ran a trade surplus. In the mid-1970s, the United States began to import more merchandise than it exported—a trade deficit.

THE ECONOMIC BASIS FOR TRADE: COMPARATIVE ADVANTAGE p. 665

3. The theory of comparative advantage, dating to David Ricardo in the nineteenth century, holds that specialization and free trade will benefit all trading partners, even those that may be absolutely less efficient producers.

4. A country enjoys an absolute advantage over another country in the production of a product if it uses fewer resources to produce that product than the other country does. A country has a comparative advantage in the production of a product if that product can be produced at a lower cost in terms of other goods.

5. Trade enables countries to move beyond their previous resource and productivity constraints. When countries specialize in producing those goods in which they have a comparative advantage, they maximize their combined output and allocate their resources more efficiently.

6. When trade is free, patterns of trade and trade flows result from the independent decisions of thousands of importers and exporters and millions of private households and firms.

7. The relative attractiveness of foreign goods to U.S. buyers and of U.S. goods to foreign buyers depends in part on exchange rates, the ratios at which two currencies are traded for each other.

8. For any pair of countries, there is a range of exchange rates that will lead automatically to both countries realizing the gains from specialization and comparative advantage. Within that range, the exchange rate will determine which country gains the most from trade. This leads us to conclude that exchange rates determine the terms of trade.

9. If exchange rates end up in the right range (that is, in a range that facilitates the flow of goods between nations), the free market will drive each country to shift resources into those sectors in which it enjoys a comparative advantage. Only those products in which a country has a comparative advantage will be competitive in world markets.

THE SOURCES OF COMPARATIVE ADVANTAGE p. 672

10. The Heckscher-Ohlin theorem looks to relative factor endowments to explain comparative advantage and trade flows. According to the theorem, a country has a comparative advantage in the production of a product if that country is relatively well endowed with the inputs that are used intensively in the production of that product.

11. A relatively short list of inputs—natural resources, knowledge capital, physical capital, land, and skilled and unskilled labor—explains a surprisingly large portion of world trade patterns. However, the simple version of the theory of comparative advantage cannot explain why many countries import and export the same goods.

12. Some theories argue that comparative advantage can be acquired. Just as industries within a country differentiate their products to capture a domestic market, they also differentiate their products to please the wide variety of tastes that exists worldwide. This theory is consistent with the theory of comparative advantage.

SUMMARY

1980–2005. The lines show an index of trade openness, calculated as 100 minus the tariff rate. (So higher numbers mean lower tariffs.) We see rapid reductions in the last 25 years across the world, most notably in countries in the emerging and developing markets.

An Economic Consensus

You now know something about how international trade fits into the structure of the economy. Critical to our study of international economics is the debate between free traders and protectionists. On one side is the theory of comparative advantage, formalized by David Ricardo in the early part of the nineteenth century. According to this view, all countries benefit from specialization and trade. The gains from trade are real, and they can be large; free international trade raises real incomes and improves the standard of living.

On the other side are the protectionists, who point to the loss of jobs and argue for the protection of workers from foreign competition. Although foreign competition can cause job loss in specific sectors, it is unlikely to cause net job loss in an economy and workers will, over time, be absorbed into expanding sectors. Foreign trade and full employment can be pursued simultaneously. Although economists disagree about many things, the vast majority of them favor free trade.
TRADE BARRIERS: TARIFFS, EXPORT SUBSIDIES, AND QUOTAS p. 673

13. Trade barriers take many forms. The three most common are tariffs, export subsidies, and quotas. All are forms of protection through which some sector of the economy is shielded from foreign competition.

14. Although the United States has historically been a high-tariff nation, the general movement is now away from tariffs and quotas. The General Agreement on Tariffs and Trade (GATT), signed by the United States and 22 other countries in 1947, continues in effect today; its purpose is to reduce barriers to world trade and keep them down. Also important are the U.S.-Canadian Free Trade Agreement, signed in 1988, and the North American Free Trade Agreement, signed by the United States, Mexico, and Canada in the last days of the George H. W. Bush administration in 1992, taking effect in 1994.

15. The World Trade Organization (WTO) was set up by GATT to act as a negotiating forum for trade disputes across countries.

16. The European Union (EU) is a free-trade bloc composed of 27 nations: Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom. Many economists believe that the advantages of free trade within the bloc, a reunited Germany, and the ability to work well as a bloc will make the EU the most powerful player in the international marketplace in the coming decades.

FREE TRADE OR PROTECTION? p. 676

17. In one sense, the theory of comparative advantage is the case for free trade. Trade barriers prevent a nation from reaping the benefits of specialization, push it to adopt relatively inefficient production techniques, and force consumers to pay higher prices for protected products than they would otherwise pay.

18. The case for protection rests on a number of propositions, one of which is that foreign competition results in a loss of domestic jobs, but there is no reason to believe that the workers laid off in the contracting sectors will not be ultimately reemployed in other expanding sectors. This adjustment process is far from costless, however.

19. Other arguments for protection hold that cheap foreign labor makes competition unfair; that some countries engage in unfair trade practices; that free trade might harm the environment; and that protection safeguards the national security, discourages dependency, and shields infant industries. Despite these arguments, most economists favor free trade.

REVIEW TERMS AND CONCEPTS

absolute advantage, p. 665
comparative advantage, p. 665
Corn Laws, p. 665
Doha Development Agenda, p. 674
dumping, p. 674
economic integration, p. 675
European Union (EU), p. 675
exchange rate, p. 670
export subsidies, p. 673
factor endowments, p. 672
General Agreement on Tariffs and Trade (GATT), p. 674
Heckscher-Ohlin theorem, p. 672
infant industry, p. 681
North American Free Trade Agreement (NAFTA), p. 675
protection, p. 673
quota, p. 674
Smoot-Hawley tariff, p. 674
tariff, p. 673
terms of trade, p. 669
theory of comparative advantage, p. 665
trade deficit, p. 664
trade surplus, p. 664
U.S.-Canadian Free Trade Agreement, p. 675
World Trade Organization (WTO), p. 674

PROBLEMS

1. Suppose Germany and France each produce only two goods, guns and butter. Both are produced using labor alone. Assuming both countries are at full employment, you are given the following information:

   Germany: 10 units of labor required to produce 1 gun
   5 units of labor required to produce 1 pound of butter
   Total labor force: 1,000,000 units

   France: 15 units of labor required to produce 1 gun
   10 units of labor required to produce 1 pound of butter
   Total labor force: 750,000 units

   a. Draw the production possibility frontiers for each country in the absence of trade.
   b. If transportation costs are ignored and trade is allowed, will France and Germany engage in trade? Explain.
   c. If a trade agreement was negotiated, at what rate (number of guns per unit of butter) would they agree to exchange?
2. The United States and Russia each produce only bearskin caps and wheat. Domestic prices are given in the following table:

<table>
<thead>
<tr>
<th>RUSSIA</th>
<th>UNITED STATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bearskin caps $10 Ru</td>
<td>$7 Per hat</td>
</tr>
<tr>
<td>Wheat $15 Ru</td>
<td>$10 Per bushel</td>
</tr>
</tbody>
</table>

On April 1, the Zurich exchange listed an exchange rate of $1 = 1 Ru.

a. Which country has an absolute advantage in the production of bearskin caps? wheat?

b. Which country has a comparative advantage in the production of bearskin caps? wheat?

c. If the United States and Russia were the only two countries engaging in trade, what adjustments would you predict assuming exchange rates are freely determined by the laws of supply and demand?

3. The following table shows imports and exports of goods during 2009 for the United States:

<table>
<thead>
<tr>
<th>EXPORTS</th>
<th>IMPORTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1,068.0</td>
</tr>
<tr>
<td>Civilian aircraft</td>
<td>35.0</td>
</tr>
<tr>
<td>Apparel, household goods–textile</td>
<td>5.0</td>
</tr>
<tr>
<td>Crude oil</td>
<td>1.0</td>
</tr>
<tr>
<td>Vehicles, parts, and engines</td>
<td>82.0</td>
</tr>
<tr>
<td>Foods, feeds, and beverages</td>
<td>94.0</td>
</tr>
</tbody>
</table>

All figures are rounded to the nearest billion dollars.
Source: www.census.gov.

What, if anything, can you conclude about the comparative advantage that the United States has relative to its trading partners in the production of goods? What stories can you tell about the wide disparities in apparel and aircraft?

4. The following table gives recent figures for yield per acre in Illinois and Kansas:

<table>
<thead>
<tr>
<th>WHEAT</th>
<th>SOYBEANS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illinois</td>
<td>48</td>
</tr>
<tr>
<td>Kansas</td>
<td>40</td>
</tr>
</tbody>
</table>

Source: U.S. Department of Agriculture, Crop Production.

a. If we assume that farmers in Illinois and Kansas use the same amount of labor, capital, and fertilizer, which state has an absolute advantage in wheat production? soybean production?

b. If we transfer land out of wheat into soybeans, how many bushels of wheat do we give up in Illinois per additional bushel of soybeans produced? in Kansas?

c. Which state has a comparative advantage in wheat production? in soybean production?

d. The following table gives the distribution of land planted for each state in millions of acres in the same year.

<table>
<thead>
<tr>
<th>TOTAL ACRES UNDER TILL</th>
<th>WHEAT</th>
<th>SOYBEANS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illinois</td>
<td>22.9</td>
<td>1.9</td>
</tr>
<tr>
<td>(8.3%)</td>
<td>(39.7%)</td>
<td></td>
</tr>
<tr>
<td>Kansas</td>
<td>20.7</td>
<td>11.8</td>
</tr>
<tr>
<td>(57.0%)</td>
<td>(9.2%)</td>
<td></td>
</tr>
</tbody>
</table>

Are these data consistent with your answer to part c? Explain.

5. You can think of the United States as a set of 50 separate economies with no trade barriers. In such an open environment, each state specializes in the products that it produces best.

a. What product or products does your state specialize in?

b. Can you identify the source of the comparative advantage that lies behind the production of one or more of these products (for example, a natural resource, plentiful cheap labor, or a skilled labor force)?

c. Do you think that the theory of comparative advantage and the Heckscher-Ohlin theorem help to explain why your state specializes the way that it does? Explain your answer.

6. Australia and the United States produce white and red wines. Current domestic prices for each wine are given in the following table:

<table>
<thead>
<tr>
<th>AUSTRALIA</th>
<th>UNITED STATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>White wine</td>
<td>5 AU$</td>
</tr>
<tr>
<td>Red wine</td>
<td>10 AU$</td>
</tr>
</tbody>
</table>

Suppose the exchange rate is 1 AU$ = 1 US$.

a. If the price ratios within each country reflect resource use, which country has a comparative advantage in the production of red wine? white wine?

b. Assume that there are no other trading partners and that the only motive for holding foreign currency is to buy foreign goods. Will the current exchange rate lead to trade flows in both directions between the two countries? Explain.

c. What adjustments might you expect in the exchange rate? Be specific.

d. What would you predict about trade flows between Australia and the United States after the exchange rate has adjusted?

7. Some empirical trade economists have noted that for many products, countries are both importers and exporters. For example, the United States both imports and exports shirts. How do you explain this?

8. [Related to the Economics in Practice on p. 676] Review the Economics in Practice on p. 676. Despite the reduction in tariffs brought about by the passage of trade agreements such as GATT, the recent recession has generated political pressure in many countries to again impose import tariffs, with this pressure especially strong in the case of imports from China. Why would a recession create pressure to impose tariffs? Who is likely to be in favor of imposing these tariffs, and who might be in favor of reducing or eliminating them? Do some research on the imposition of tariffs during the recent recession. Did many countries actually impose new tariffs on imports? What has been the response of the WTO and countries like China to the imposition of these tariffs?

9. [Related to the Economics in Practice on p. 679] When a president presents a trade agreement for ratification to Congress, many domestic industries fight the ratification. In 2005, the United States was negotiating the Central America-Dominican Republic Free Trade Agreement (CAFTA-DR). Write a brief essay on the U.S. political opposition to CAFTA-DR in 2004 and 2005. What industries in the United States opposed the trade agreement? Is it fair to compare the arguments of these industries to the arguments posed by the candle makers?

10. The following graph represents the domestic supply and demand for coffee a number of years ago.

a. In the absence of trade, what is the equilibrium price and equilibrium quantity?
b. The government opens the market to free trade, and Columbia enters the market, pricing coffee at $1 per pound. What will happen to the domestic price of coffee? What will be the new domestic quantity supplied and domestic quantity demanded? How much coffee will be imported from Columbia?
c. After numerous complaints from domestic coffee producers, the government imposes a $0.50 per pound tariff on all imported coffee. What will happen to the domestic price of coffee? What will be the new domestic quantity supplied and domestic quantity demanded? How much coffee will now be imported from Columbia?
d. How much revenue will the government receive from the $0.50 per pound tariff?
e. Who ultimately ends up paying the $0.50 per pound tariff? Why?

11. Refer to the previous problem. Assume the market is opened to trade and Columbia still enters the market by pricing coffee at $1.00 per pound. But as a response to complaints from domestic coffee producers, instead of imposing a $0.50 per pound tariff, the government imposes an import quota of 50 million pounds on Columbian coffee. How will the results of the quota differ from the results of the tariff?

12. The nation of Pixley has an absolute advantage in everything it produces compared to the nation of Hooterville. Could these two nations still benefit by trading with each other? Explain.

13. Evaluate the following statement: If lower exchange rates increase a nation’s exports, the government should do everything in its power to ensure that the exchange rate for its currency is as low as possible.

14. Since the 1960s, the United States has had an embargo in place on Cuba, virtually eliminating all trade between the two countries. Suppose the United States decided to lift the embargo on exports to Cuba while maintaining the embargo on Cuban imports. Explain whether this one-sided change would benefit neither country, just one country, or both countries?
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The economies of the world have become increasingly interdependent over the last four decades. No economy operates in a vacuum, and economic events in one country can have significant repercussions on the economies of other countries.

International trade is a major part of today’s world economy. U.S. imports now account for about 15 percent of U.S. gross domestic product (GDP), and billions of dollars flow through the international capital market each day. In Chapter 34, we explored the main reasons why there is international exchange. Countries trade with one another to obtain goods and services they cannot produce themselves or to take advantage of the fact that other countries can produce goods and services at a lower cost than they can. You can see the various connections between the domestic economy and the rest of the world in the circular flow diagram in Figure 20.3 on p. 413. Foreign countries supply goods and services to the United States, and the United States supplies goods and services to the rest of the world.

From a macroeconomic point of view, the main difference between an international transaction and a domestic transaction concerns currency exchange. When people in countries with different currencies buy from and sell to each other, an exchange of currencies must also take place. Brazilian coffee exporters cannot spend U.S. dollars in Brazil—they need Brazilian reals. A U.S. wheat exporter cannot use Brazilian reals to buy a tractor from a U.S. company or to pay the rent on warehouse facilities. Somehow international exchange must be managed in a way that allows both partners in the transaction to wind up with their own currency.

As you know from Chapter 34, the direction of trade between two countries depends on exchange rates—the price of one country’s currency in terms of the other country’s currency. If the Japanese yen were very expensive (making the dollar cheap), both Japanese and Americans would buy from U.S. producers. If the yen were very cheap (making the U.S. dollar expensive), both Japanese and Americans would buy from Japanese producers. Within a certain range of exchange rates, trade flows in both directions, each country specializes in producing the goods in which it enjoys a comparative advantage, and trade is mutually beneficial.

Because exchange rates are a factor in determining the flow of international trade, the way they are determined is very important. Since 1900, the world monetary system has been changed several times by international agreements and events. In the early part of the twentieth century, nearly all currencies were backed by gold. Their values were fixed in terms of a specific number of ounces of gold, which determined their values in international trading—exchange rates.
In 1944, with the international monetary system in chaos as the end of World War II drew near, a large group of experts unofficially representing 44 countries met in Bretton Woods, New Hampshire, and drew up a number of agreements. One of those agreements established a system of essentially fixed exchange rates under which each country agreed to intervene by buying and selling currencies in the foreign exchange market when necessary to maintain the agreed-to value of its currency.

In 1971, most countries, including the United States, gave up trying to fix exchange rates formally and began allowing them to be determined essentially by supply and demand. For example, without government intervention in the marketplace, the price of British pounds in dollars is determined by the interaction of those who want to exchange dollars for pounds (those who “demand” pounds) and those who want to exchange pounds for dollars (those who “supply” pounds). If the quantity of pounds demanded exceeds the quantity of pounds supplied, the price of pounds will rise, just as the price of peanuts or paper clips would rise under similar circumstances. A more detailed discussion of the various monetary systems that have been in place since 1900 is provided in the Appendix to this chapter.

In this chapter, we explore in more detail what has come to be called open-economy macroeconomics. First, we discuss the balance of payments—the record of a nation’s transactions with the rest of the world. We then go on to consider how the analysis changes when we allow for the international exchange of goods, services, and capital.

The Balance of Payments

We sometimes lump all foreign currencies—euros, Swiss francs, Japanese yen, Brazilian reals, and so forth—together as “foreign exchange.” Foreign exchange is simply all currencies other than the domestic currency of a given country (in the case of the United States, the U.S. dollar). U.S. demand for foreign exchange arises because its citizens want to buy things whose prices are quoted in other currencies, such as Australian jewelry, vacations in Mexico, and bonds or stocks issued by Sony Corporation of Japan. Whenever U.S. citizens make these purchases, they first buy the foreign currencies and then make the purchases.

Where does the supply of foreign exchange come from? The answer is simple: The United States (actually U.S. citizens or firms) earns foreign exchange when it sells products, services, or assets to another country. Just as Mexico earns foreign exchange when U.S. tourists visit Cancún, the United States earns foreign exchange (in this case, Mexican pesos) when Mexican tourists come to the United States to visit Disney World. Similarly, Saudi Arabian purchases of stock in General Motors and Colombian purchases of real estate in Miami increase the U.S. supply of foreign exchange.

The record of a country’s transactions in goods, services, and assets with the rest of the world is its balance of payments. The balance of payments is also the record of a country’s sources (supply) and uses (demand) of foreign exchange.¹

The Current Account

The balance of payments is divided into two major accounts, the current account and the capital account. These are shown in Table 35.1, which provides data on the U.S. balance of payments for 2009. We begin with the current account.

The first item in the current account is U.S. trade in goods. This category includes exports of computer chips, potato chips, and CDs of U.S. musicians and imports of Scotch whiskey, Chinese toys, and Mexican oil. U.S. exports earn foreign exchange for the United States and are a credit (+) item on the current account. U.S. imports use up foreign exchange and are a debit (−) item. In 2009, the United States imported $517.1 billion more in goods than it exported.

Next in the current account is services. Like most other countries, the United States buys services from and sells services to other countries. For example, a U.S. firm shipping wheat to England might purchase insurance from a British insurance company. A Dutch flower grower may fly flowers to the United States aboard an American airliner. In the first case, the United States is importing services and therefore using up foreign exchange; in the second case, it is selling services to foreigners and earning foreign exchange. In 2009, the United States exported $138.4 billion more in services than it imported.

¹ Bear in mind the distinction between the balance of payments and a balance sheet. A balance sheet for a firm or a country measures that entity’s stock of assets and liabilities at a moment in time. The balance of payments, by contrast, measures flows, usually over a period of a month, a quarter, or a year. Despite its name, the balance of payments is not a balance sheet.
The difference between a country’s exports of goods and services and its imports of goods and services is its **balance of trade**. When exports of goods and services are less than imports of goods and services, a country has a **trade deficit**. The U.S. trade deficit in 2009 was large: $378.2 billion (that is, $517.1 billion less $138.4 billion).

The third item in the current account concerns investment income. U.S. citizens hold foreign assets (stocks, bonds, and real assets such as buildings and factories). Dividends, interest, rent, and profits paid to U.S. asset holders are a source of foreign exchange. Conversely, when foreigners earn dividends, interest, and profits on assets held in the United States, foreign exchange is used up. In 2009, investment income received from foreigners exceeded investment income paid to foreigners by $89.0 billion.

The fourth item in Table 35.1 is net transfer payments. Transfer payments from the United States to foreigners are another use of foreign exchange. Some of these transfer payments are from private U.S. citizens, and some are from the U.S. government. You may send a check to a relief agency in Africa. Many immigrants in the United States send remittances to their countries of origin to help support extended families. Conversely, some foreigners make transfer payments to the United States. Net refers to the difference between payments from the United States to foreigners and payments from foreigners to the United States.

If we add net exports of goods, net export of services, net investment income, and net transfer payments, we get the **balance on current account**. The balance on current account shows how much a nation has spent on foreign goods, services, investment income payments, and transfers relative to how much it has earned from other countries. When the balance is negative, which it was for the United States in 2009, a nation has spent more on foreign goods and services (plus investment income and transfers paid) than it has earned through the sales of its goods and services to the rest of the world (plus investment income and transfers received). If a nation has spent more on foreign goods, services, investment income payments, and transfers than it has earned, its net wealth position vis-à-vis the rest of the world must decrease. By *net*, we mean a nation’s assets abroad minus its liabilities to the rest of the world. The capital account of the balance of payments records the changes in these assets and liabilities. We now turn to the capital account.

---

**TABLE 35.1 United States Balance of Payments, 2009**

<table>
<thead>
<tr>
<th>Current Account</th>
<th>Billions of dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goods exports</td>
<td>1,045.5</td>
</tr>
<tr>
<td>Goods imports</td>
<td>-1,562.6</td>
</tr>
<tr>
<td>(1) Net export of goods</td>
<td>-517.1</td>
</tr>
<tr>
<td>Exports of services</td>
<td>509.2</td>
</tr>
<tr>
<td>Imports of services</td>
<td>-370.8</td>
</tr>
<tr>
<td>(2) Net export of services</td>
<td>138.4</td>
</tr>
<tr>
<td>Income received on investments</td>
<td>561.2</td>
</tr>
<tr>
<td>Income payments on investments</td>
<td>-472.2</td>
</tr>
<tr>
<td>(3) Net investment income</td>
<td>89.0</td>
</tr>
<tr>
<td>(4) Net transfer payments</td>
<td>-130.2</td>
</tr>
<tr>
<td>(5) Balance on current account (1 + 2 + 3 + 4)</td>
<td>-419.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Capital Account</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(6) Change in private U.S. assets abroad (increase is –)</td>
<td>-727.0</td>
</tr>
<tr>
<td>(7) Change in foreign private assets in the United States</td>
<td>-12.3</td>
</tr>
<tr>
<td>(8) Change in U.S. government assets abroad (increase is –)</td>
<td>489.6</td>
</tr>
<tr>
<td>(9) Change in foreign government assets in the United States</td>
<td>447.6</td>
</tr>
<tr>
<td>(10) Balance on capital account (6 + 7 + 8 + 9)</td>
<td>197.9</td>
</tr>
<tr>
<td>(11) Net capital account transactions</td>
<td>-2.9</td>
</tr>
<tr>
<td>(12) Statistical discrepancy</td>
<td>224.9</td>
</tr>
<tr>
<td>(13) Balance of payments (5 + 10 + 11 + 12)</td>
<td>0</td>
</tr>
</tbody>
</table>

PART VII  
The World Economy

The World Economy

balance on capital account
In the United States, the sum of the following (measured in a given period): the change in private U.S. assets abroad, the change in foreign private assets in the United States, the change in U.S. government assets abroad, and the change in foreign government assets in the United States.

The Capital Account
For each transaction recorded in the current account, there is an offsetting transaction recorded in the capital account. Consider the purchase of a Japanese car by a U.S. citizen. Say that the yen/dollar exchange rate is 100 yen to a dollar and that the yen price of the car is 2.0 million yen, which is $20,000. The U.S. citizen (probably an automobile dealer) takes $20,000, buys 2.0 million yen, and then buys the car. In this case, U.S. imports are increased by $20,000 in the current account and foreign assets in the United States (in this case, Japanese holdings of dollars) are increased by $20,000 in the capital account. The net wealth position of the United States vis-à-vis the rest of the world has decreased by $20,000. The key point to realize is that an increase in U.S. imports results in an increase in foreign assets in the United States. The United States must “pay” for the imports, and whatever it pays with (in this example, U.S. dollars) is an increase in foreign assets in the United States. Conversely, an increase in U.S. exports results in an increase in U.S. assets abroad because foreigners must pay for the U.S. exports.

Table 35.1 shows that U.S. assets abroad are divided into private holdings (line 6) and U.S. government holdings (line 8). Similarly, foreign assets in the United States are divided into foreign private (line 7) and foreign government (line 9). The sum of lines 6, 7, 8, and 9 is the balance on capital account (line 10). The next item is called net capital account transactions (line 11). It is quite small in value and includes things such as U.S. government debt forgiveness. These kinds of transactions affect the capital account but not the current account. Ignoring this item, if there were no errors of measurement in the data collection, the balance on capital account would equal the negative of the balance on current account because, as mentioned previously, for each transaction in the current account, there is an offsetting transaction in the capital account. Another way of looking at the balance on capital account is that it is the change in the net wealth position of the country vis-à-vis the rest of the world. When the balance on capital account is positive, this means that the change in foreign assets in the country is greater than the change in the country’s assets abroad, which is a decrease in the net wealth position of the country.

Table 35.1 shows that in 2009, the U.S. balance on current account was $-419.9 billion, which means that the United States spent considerably more than it made vis-à-vis the rest of the world. If the balance on current account is measured correctly, the net wealth position of the United States vis-à-vis the rest of the world should have decreased by $419.9 billion in 2009 plus the $2.9 billion in line 11, or $422.8 billion. The balance on capital account (line 10) is in fact $197.9 billion; so the error of measurement, called the statistical discrepancy, is $224.9 billion (line 12) in 2009. The balance of payments (line 13) is the sum of the balance on current account, the balance on capital account, net capital account transactions, and the statistical discrepancy. By construction, it is always zero.

It is important to note from Table 35.1 that even though the net wealth position of the United States decreased in 2009, the change in U.S. assets abroad increased ($727.0 billion private minus $489.6 billion government). How can this be? Because there was an even larger increase in foreign assets in the United States ($-12.3 billion private plus $447.6 billion government). It is the net change (that is, the change in foreign assets in the United States minus the change in U.S. assets abroad) that is equal to the negative of the balance on current account (aside from the statistical discrepancy), not the change in just U.S. assets abroad. Much of the increase of $447.6 billion in foreign government assets was the accumulation of dollars by China.

Many transactions are recorded in the capital account that do not pertain to the current account. Consider a purchase of a U.K. security by a U.S. resident. This is done by the U.S. resident’s selling dollars for pounds and using the pounds to buy the U.K. security. After this transaction, U.S. assets abroad have increased (the United States now holds more U.K. securities) and foreign assets in the United States have increased (foreigners now hold more dollars). The purchase of the U.K. security is recorded as a minus item in line 6 in Table 35.1, and the increase in foreign holdings of dollars is recorded as a plus item in line 7. These two balance out. This happens whenever there is a switch of one kind of asset for another vis-à-vis the rest of the world. In recent years, a number of business people from the oil-rich Middle East purchased apartments in U.S. cities like New York and San Francisco. These real estate investments
increased foreign assets in the United States (real estate) and increased U.S. assets abroad (foreign currency from the Middle East).

The United States as a Debtor Nation

If a country has a positive net wealth position vis-à-vis the rest of the world, it can be said to be a creditor nation. Conversely, if it has a negative net wealth position, it can be said to be a debtor nation. Remember that a country’s net wealth position increases if it has a positive current account balance and decreases if it has a negative current account balance. It is important to realize that the only way a country’s net wealth position can change is if its current account balance is nonzero. Simply switching one form of asset for another, such as trading real estate for foreign currency, is not a change in a country’s net wealth position. Another way of putting this is that a country’s net wealth position is the sum of all its past current account balances.

Prior to the mid-1970s, the United States had generally run current account surpluses, and thus its net wealth position was positive. It was a creditor nation. This began to turn around in the mid-1970s, and by the mid-1980s, the United States was running large current account deficits. Sometime during this period, the United States changed from having a positive net wealth position vis-à-vis the rest of the world to having a negative position. In other words, the United States changed from a creditor nation to a debtor nation. The current account deficits persisted into the 1990s, and the United States is now the largest debtor nation in the world. In 2008, foreign assets in the United States totaled $23.7 trillion and U.S. assets abroad totaled $19.9 trillion. The U.S. net wealth position was thus −$3.5 trillion. This large negative position reflects the fact that the United States spent much more in the 1980s, 1990s, and 2000s on foreign goods and services (plus investment income and transfers paid) than it earned through the sales of its goods and services to the rest of the world (plus investment income and transfers received).

---

Equilibrium Output (Income) in an Open Economy

Everything we have said so far has been descriptive. Now we turn to analysis. How are all these trade and capital flows determined? What impacts do they have on the economies of the countries involved? To simplify our discussion, we will assume that exchange rates are fixed. We will relax this assumption later.

The International Sector and Planned Aggregate Expenditure

Our earlier descriptions of the multiplier took into account the consumption behavior of households (C), the planned investment behavior of firms (I), and the spending of the government (G). We defined the sum of those three components as planned aggregate expenditure (AE).

To analyze the international sector, we must include the goods and services a country exports to the rest of the world as well as what it imports. If we call our exports of goods and services EX, it should be clear that EX is a component of total output and income. A U.S. razor sold to a buyer in Mexico is as much a part of U.S. production as a similar razor sold in Pittsburgh. Exports simply represent demand for domestic products not by domestic households and firms and the government, but by the rest of the world.

What about imports (IM)? Remember, imports are not a part of domestic output (Y). By definition, imports are not produced by the country that is importing them. Remember also, when we look at households’ total consumption spending, firms’ total investment spending, and total government spending, imports are included. Therefore, to calculate domestic output correctly, we must subtract the parts of consumption, investment, and government spending that constitute imports. The definition of planned aggregate expenditure becomes:

\[ AE = C + I + G + EX - IM \]

The last two terms \((EX - IM)\) together are the country’s net exports of goods and services.

Determining the Level of Imports

What determines the level of imports and exports in a country? For now, we assume that the level of imports is a function of income \((Y)\). The rationale is simple: When U.S. income increases, U.S. citizens buy more of everything, including U.S. cars and peanut butter, Japanese TV sets, and Korean steel and DVD players. When income rises, imports tend to go up. Algebraically,

\[ IM = mY \]

where \(Y\) is income and \(m\) is some positive number. (\(m\) is assumed to be less than 1; otherwise, a $1 increase in income generates an increase in imports of more than $1, which is unrealistic.) Recall from Chapter 23 that the marginal propensity to consume (MPC) measures the change in consumption that results from a $1 change in income. Similarly, the marginal propensity to import, abbreviated as \(MPM\) or \(m\), is the change in imports caused by a $1 change in income. If \(m = .2\), or 20 percent, and income is $1,000, then imports, \(IM\), are equal to \(.2 \times 1,000 = 200\). If income rises by $100 to $1,100, the change in imports will equal \(m \times \) (the change in income) = \(.2 \times 100 = 20\).

For now we will assume that exports \((EX)\) are given (that is, they are not affected, even indirectly, by the state of the economy.) This assumption is relaxed later in this chapter.

Solving for Equilibrium

Given the assumption about how imports are determined, we can solve for equilibrium income. This procedure is illustrated in Figure 35.1. Starting from the consumption function (blue line) in Figure 35.1(a), we gradually build up the components of planned aggregate expenditure (red line). Assuming for simplicity that planned investment, government purchases, and exports are all constant and do not depend on income, we move easily from the blue line to the red line by adding the fixed amounts of \(I\), \(G\), and \(EX\) to consumption at every level of income. In this example, we take \(I + G + EX\) to equal 80.

\(C + I + G + EX\), however, includes spending on imports, which are not part of domestic production. To get spending on domestically produced goods, we must subtract the amount that is
imported at each level of income. In Figure 35.1(b), we assume $m = .25$, which is the assumption that 25 percent of total income is spent on goods and services produced in foreign countries. Imports under this assumption are a constant fraction of total income; therefore, at higher levels of income, a larger amount is spent on foreign goods and services. For example, at $Y = 200$, $IM = .25 \times 200 = 50$. Similarly, at $Y = 400$, $IM = .25 \times 400 = 100$. Figure 35.1(b) shows the planned domestic aggregate expenditure curve.

Equilibrium is reached when planned domestic aggregate expenditure equals domestic aggregate output ($Y^*$). This is true at only one level of aggregate output, $Y^* = 200$, in Figure 35.1(b). If $Y$ were below $Y^*$, planned expenditure would exceed output, inventories would be lower than planned, and output would rise. At levels above $Y^*$, output would exceed planned expenditure, inventories would be larger than planned, and output would fall.

The Open-Economy Multiplier All of this has implications for the size of the multiplier. Recall the multiplier, introduced in Chapter 23, and consider a sustained rise in government purchases ($G$). Initially, the increase in $G$ will cause planned aggregate expenditure to be greater than aggregate output. Domestic firms will find their inventories to be lower than planned and thus will increase their output, but added output means more income. More workers are hired, and profits are higher. Some of the added income is saved, and some is spent. The added consumption spending leads to a second round of inventories being lower than planned and raising output. Equilibrium output rises by a multiple of the initial increase in government purchases. This is the multiplier.

In Chapters 23 and 24, we showed that the simple multiplier equals $1/(1 - MPC)$, or $(1/MPS)$. That is, a sustained increase in government purchases equal to $\Delta G$ will lead to an increase in aggregate output (income) of $\Delta G \times [1/(1 - MPC)]$. If the $MPC$ were .75 and government purchases rose by $10$ billion, equilibrium income would rise by $4 \times 10$ billion, or $40$ billion. The multiplier is $[1/(1 - .75)] = [1/.25] = 4.0$.

In an open economy, some of the increase in income brought about by the increase in $G$ is spent on imports instead of domestically produced goods and services. The part of income spent on imports does not increase domestic income ($Y$) because imports are produced by foreigners. To compute the multiplier, we need to know how much of the increased income is used to increase domestic consumption. (We are assuming all imports are consumption goods. In practice, some imports are investment goods and some are goods purchased by the government.) In other words, we need to know the marginal propensity to consume domestic goods. Domestic consumption is $C - IM$. So the marginal propensity to consume domestic goods is the marginal

\[ m = \frac{1}{1 - \text{MPC}_D} \]
propensity to consume all goods (the \(MPC\)) minus the marginal propensity to import (the \(MPM\)). The marginal propensity to consume domestic goods is \((MPC - MPM)\). Consequently,

\[
\text{open-economy multiplier} = \frac{1}{1 - (MPC - MPM)}
\]

If the \(MPC\) is .75 and the \(MPM\) is .25, then the multiplier is 1/5, or 2.0. This multiplier is smaller than the multiplier in which imports are not taken into account, which is 1/25, or 4.0. The effect of a sustained increase in government spending (or investment) on income—that is, the multiplier—is smaller in an open economy than in a closed economy. The reason: When government spending (or investment) increases and income and consumption rise, some of the extra consumption spending that results is on foreign products and not on domestically produced goods and services.

Imports and Exports and the Trade Feedback Effect

For simplicity, we have so far assumed that the level of imports depends only on income and that the level of exports is fixed. In reality, the amount of spending on imports depends on factors other than income and exports are not fixed. We will now consider the more realistic picture.

**The Determinants of Imports** The same factors that affect households’ consumption behavior and firms’ investment behavior are likely to affect the demand for imports because some imported goods are consumption goods and some are investment goods. For example, anything that increases consumption spending is likely to increase the demand for imports. We saw in Chapters 23 and 26 that factors such as the after-tax real wage, after-tax nonlabor income, and interest rates affect consumption spending; thus, they should also affect spending on imports. Similarly, anything that increases investment spending is likely to increase the demand for imports. A decrease in interest rates, for example, should encourage spending on both domestically produced goods and foreign-produced goods.

There is one additional consideration in determining spending on imports: the relative prices of domestically produced and foreign-produced goods. If the prices of foreign goods fall relative to the prices of domestic goods, people will consume more foreign goods relative to domestic goods. When Japanese cars are inexpensive relative to U.S. cars, consumption of Japanese cars should be high and vice versa.

**The Determinants of Exports** We now relax our assumption that exports are fixed. The demand for U.S. exports by other countries is identical to their demand for imports from the United States. Germany imports goods, some of which are U.S.-produced. France, Spain, and so on do the same. Total expenditure on imports in Germany is a function of the factors we just discussed except that the variables are German variables instead of U.S. variables. This is true for all other countries as well. The demand for U.S. exports depends on economic activity in the rest of the world—rest-of-the-world real wages, wealth, nonlabor income, interest rates, and so forth—as well as on the prices of U.S. goods relative to the price of rest-of-the-world goods. When foreign output increases, U.S. exports tend to increase. U.S. exports also tend to increase when U.S. prices fall relative to those in the rest of the world.

**The Trade Feedback Effect** We can now combine what we know about the demand for imports and the demand for exports to discuss the trade feedback effect. Suppose the United States finds its exports increasing, perhaps because the world suddenly decides it prefers U.S. computers to other computers. Rising exports will lead to an increase in U.S. output (income), which leads to an increase in U.S. imports. Here is where the trade feedback begins. Because U.S. imports are somebody else’s exports, the extra import demand from the United States raises the exports of the rest of the world. When other countries’ exports to the United States go up, their output and incomes also rise, in turn leading to an increase in the demand for imports from the rest of the world. Some of the extra imports demanded by the rest of the world come from the United States, so U.S. exports increase. The increase in U.S. exports stimulates U.S. economic activity even more, triggering a further increase in the U.S. demand for imports and so on. An increase in U.S. imports increases other countries’ exports, which stimulates those countries’ economies and increases their imports, which increases U.S. exports, which stimulates the U.S. economy and increases its imports, and so on. This is the
The Recession Takes Its Toll on Trade

During recessions, people in many countries become more protectionist and seek to protect jobs in their own home industries by limiting imports. Chapter 34 described some of the economic costs of this protectionism. What fewer people recognize is the effect of recessions on the overall level of trade in the world. As the text describes, there is a trade-feedback effect in which growth in one country leads to growth in other countries, further enhancing growth in the first country. In the recession of 2008–2009, this feedback effect was quite apparent (in the negative direction).

The Paris-based Organization for Economic Cooperation and Development (OECD) collects data on trade levels for a number of countries. The figure below shows the rise in trade levels in the world over the period 2005 to the middle of 2008 followed by large declines in the 2008–2009 recession.

The trade feedback effect. In other words, an increase in U.S. economic activity leads to a worldwide increase in economic activity, which then “feeds back” to the United States.

Import and Export Prices and the Price Feedback Effect

We have talked about the price of imports, but we have not yet discussed the factors that influence import prices. The consideration of import prices is complicated because more than one currency is involved. When we talk about “the price of imports,” do we mean the price in dollars, in yen, in U.K. pounds, in Mexican pesos, and so on? Because the exports of one country are the imports of another, the same question holds for the price of exports. When Mexico exports auto parts to the United States, Mexican manufacturers are interested in the price of auto parts in terms of pesos because pesos are what they use for transactions in Mexico. U.S. consumers are interested in the price of auto parts in dollars because dollars are what they use for transactions in the United States. The link between the two prices is the dollar/peso exchange rate.

Suppose Mexico is experiencing inflation and the price of radiators in pesos rises from 1,000 pesos to 1,200 pesos per radiator. If the dollar/peso exchange rate remains unchanged at, say, $0.10 per peso, Mexico’s export price for radiators in terms of dollars will also rise, from $100 to $120 per radiator. Because Mexico’s exports to the United States are, by definition, U.S. imports from Mexico, an increase in the dollar prices of Mexican exports to the United States means an increase in the prices of U.S. imports from Mexico. Therefore, when Mexico’s export prices rise with no change in the dollar/peso exchange rate, U.S. import prices rise. Export prices of other countries affect U.S. import prices.

A country’s export prices tend to move fairly closely with the general price level in that country. If Mexico is experiencing a general increase in prices, this change likely will be reflected in price increases of all domestically produced goods, both exportable and nonexportable. The general rate of inflation abroad is likely to affect U.S. import prices. If the inflation rate abroad is high, U.S. import prices are likely to rise.

The Price Feedback Effect We have just seen that when a country experiences an increase in domestic prices, the prices of its exports will increase. It is also true that when the prices of a country’s imports increase, the prices of domestic goods may increase in response. There are at least two ways this effect can occur.
First, an increase in the prices of imported inputs will shift a country’s aggregate supply curve to the left. In Chapter 28, we discussed the macroeconomy’s response to a cost shock. Recall that a leftward shift in the aggregate supply curve due to a cost increase causes aggregate output to fall and prices to rise (stagflation).

Second, if import prices rise relative to domestic prices, households will tend to substitute domestically produced goods and services for imports. This is equivalent to a rightward shift of the aggregate demand curve. If the domestic economy is operating on the upward-sloping part of the aggregate supply curve, the overall domestic price level will rise in response to an increase in aggregate demand. Perfectly competitive firms will see market-determined prices rise, and imperfectly competitive firms will experience an increase in the demand for their products. Studies have shown, for example, that the price of automobiles produced in the United States moves closely with the price of imported cars.

Still, this is not the end of the story. Suppose a country—say, Mexico—experiences an increase in its domestic price level. This will increase the price of its exports to Canada (and to all other countries). The increase in the price of Canadian imports from Mexico will lead to an increase in domestic prices in Canada. Canada also exports to Mexico. The increase in Canadian prices causes an increase in the price of Canadian exports to Mexico, which then further increases the Mexican price level.

This is called the **price feedback effect**, in the sense that inflation is “exportable.” An increase in the price level in one country can drive up prices in other countries, which in turn further increases the price level in the first country. Through export and import prices, a domestic price increase can “feed back” on itself.

It is important to realize that the discussion so far has been based on the assumption of fixed exchange rates. Life is more complicated under flexible exchange rates, to which we now turn.

### The Open Economy with Flexible Exchange Rates

To a large extent, the fixed exchange rates set by the Bretton Woods agreements served as international monetary arrangements until 1971. Then in 1971, the United States and most other countries decided to abandon the fixed exchange rate system in favor of floating, or market-determined, exchange rates. Although governments still intervene to ensure that exchange rate movements are “orderly,” exchange rates today are largely determined by the unregulated forces of supply and demand.

Understanding how an economy interacts with the rest of the world when exchange rates are not fixed is not as simple as when we assume fixed exchange rates. Exchange rates determine the price of imported goods relative to domestic goods and can have significant effects on the level of imports and exports. Consider a 20 percent drop in the value of the dollar against the British pound. Dollars buy fewer pounds, and pounds buy more dollars. Both British residents, who now get more dollars for pounds, and U.S. residents, who get fewer pounds for dollars, find that U.S. goods and services are more attractive. Exchange rate movements have important impacts on imports, exports, and the movement of capital between countries.

### The Market for Foreign Exchange

What determines exchange rates under a floating rate system? To explore this question, we assume that there are just two countries, the United States and Great Britain. It is easier to understand a world with only two countries, and most of the points we will make can be generalized to a world with many trading partners.

#### The Supply of and Demand for Pounds

Governments, private citizens, banks, and corporations exchange pounds for dollars and dollars for pounds every day. In our two-country case, those who demand pounds are holders of dollars seeking to exchange them for pounds. Those who supply pounds are holders of pounds seeking to exchange them for dollars. It is important not to confuse the supply of dollars (or pounds) on the foreign exchange market with
the U.S. (or British) money supply. The latter is the sum of all the money currently in circulation. The supply of dollars on the foreign exchange market is the number of dollars that holders seek to exchange for pounds in a given time period. The demand for and supply of dollars on foreign exchange markets determine exchange rates; the demand for money balances, and the total domestic money supply determine the interest rate.

The common reason for exchanging dollars for pounds is to buy something produced in Great Britain. U.S. importers who purchase Jaguar automobiles or Scotch whiskey must pay with pounds. U.S. citizens traveling in Great Britain who want to ride the train, stay in a hotel, or eat at a restaurant must acquire pounds for dollars to do so. If a U.S. corporation builds a plant in Great Britain, it must pay for that plant in pounds.

At the same time, some people may want to buy British stocks or bonds. Implicitly, when U.S. citizens buy a bond issued by the British government or by a British corporation, they are making a loan, but the transaction requires a currency exchange. The British bond seller must ultimately be paid in pounds.

On the supply side of the market, the situation is reversed. Here we find people—usually British citizens—holding pounds they want to use to buy dollars. Again, the common reason is to buy things produced in the United States. If a British importer decides to import golf carts made in Georgia, the producer must be paid in dollars. British tourists visiting New York may ride in cabs, eat in restaurants, and tour Ellis Island. Doing those things requires dollars. When a British firm builds an office complex in Los Angeles, it must pay the contractor in dollars.

In addition to buyers and sellers who exchange money to engage in transactions, some people and institutions hold currency balances for speculative reasons. If you think that the U.S. dollar is going to decline in value relative to the pound, you may want to hold some of your wealth in the form of pounds. Table 35.2 summarizes some of the major categories of private foreign exchange demanders and suppliers in the two-country case of the United States and Great Britain.

Figure 35.2 shows the demand curve for pounds in the foreign exchange market. When the price of pounds (the exchange rate) is lower, it takes fewer dollars to buy British goods and services, to build a plant in Liverpool, to travel to London, and so on. Lower net prices (in dollars) should increase the demand for British-made products and encourage investment and travel in Great Britain. If prices (in pounds) in Britain do not change, an increase in the quantity of British goods and services demanded by foreigners will increase the quantity of pounds demanded. The demand-for-pounds curve in the foreign exchange market has a negative slope.

Figure 35.3 shows a supply curve for pounds in the foreign exchange market. At a higher exchange rate, each pound buys more dollars, making the price of U.S.-produced goods and services lower to the British. The British are more apt to buy U.S.-made goods when the price of pounds is high (the value of the dollar is low). An increase in British demand for U.S. goods and

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**TABLE 35.2** Some Buyers and Sellers in International Exchange Markets: United States and Great Britain

<table>
<thead>
<tr>
<th>The Demand for Pounds (Supply of Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Firms, households, or governments that import British goods into the United States or want to buy British-made goods and services</td>
</tr>
<tr>
<td>2. U.S. citizens traveling in Great Britain</td>
</tr>
<tr>
<td>3. Holders of dollars who want to buy British stocks, bonds, or other financial instruments</td>
</tr>
<tr>
<td>4. U.S. companies that want to invest in Great Britain</td>
</tr>
<tr>
<td>5. Speculators who anticipate a decline in the value of the dollar relative to the pound</td>
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</tbody>
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<thead>
<tr>
<th>The Supply of Pounds (Demand for Dollars)</th>
</tr>
</thead>
<tbody>
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<td>1. Firms, households, or governments that import U.S. goods into Great Britain or want to buy U.S.-made goods and services</td>
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<tr>
<td>2. British citizens traveling in the United States</td>
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<td>4. British companies that want to invest in the United States</td>
</tr>
<tr>
<td>5. Speculators who anticipate a rise in the value of the dollar relative to the pound</td>
</tr>
</tbody>
</table>

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PART VII
The World Economy

services is likely to increase the quantity of pounds supplied. The curve representing the supply of pounds in the foreign exchange market has a positive slope.

The Equilibrium Exchange Rate When exchange rates are allowed to float, they are determined the same way other prices are determined: the equilibrium exchange rate occurs at the point at which the quantity demanded of a foreign currency equals the quantity of that currency supplied. This is illustrated in Figure 35.4. An excess demand for pounds (quantity demanded in excess of quantity supplied) will cause the price of pounds to rise—the pound will appreciate relative to the dollar. An excess supply of pounds will cause the price of pounds to fall—the pound will depreciate relative to the dollar.3

3 Although Figure 35.3 shows the supply-of-pounds curve in the foreign exchange market with a positive slope, under certain circumstances the curve may bend back. Suppose the price of a pound rises from $1.50 to $2.00. Consider a British importer who buys 10 Chevrolets each month at $15,000 each, including transportation costs. When a pound exchanges for $1.50, he will supply 100,000 pounds per month to the foreign exchange market—100,000 pounds brings $150,000, enough to buy 10 cars. Now suppose the cheaper dollar causes him to buy 12 cars. Twelve cars will cost a total of $180,000; but at $2 = 1 pound, he will spend only 90,000 pounds per month. The supply of pounds on the market falls when the price of pounds rises. The reason for this seeming paradox is simple. The number of pounds a British importer needs to buy U.S. goods depends on both the quantity of goods he buys and the price of those goods in pounds. If demand for imports is inelastic so that the percentage decrease in price resulting from the depreciated currency is greater than the percentage increase in the quantity of imports demanded, importers will spend fewer pounds and the quantity of pounds supplied in the foreign exchange market will fall. The supply of pounds will slope upward as long as the demand for U.S. imports is elastic.
Factors That Affect Exchange Rates

We now know enough to discuss the factors likely to influence exchange rates. Anything that changes the behavior of the people in Table 35.2 can cause demand and supply curves to shift and the exchange rate to adjust accordingly.

**Purchasing Power Parity: The Law of One Price**  If the costs of transporting goods between two countries are small, we would expect the price of the same good in both countries to be roughly the same. The price of basketballs should be roughly the same in Canada and the United States, for example.

It is not hard to see why. If the price of basketballs is cheaper in Canada, it will pay for someone to buy balls in Canada at a low price and sell them in the United States at a higher price. This decreases the supply and pushes up the price in Canada and increases the supply and pushes down the price in the United States. This process should continue as long as the price differential, and therefore the profit opportunity, persists. For a good with trivial transportation costs, we would expect this law of one price to hold. The price of a good should be the same regardless of where we buy it.

If the law of one price held for all goods and if each country consumed the same market basket of goods, the exchange rate between the two currencies would be determined simply by the relative price levels in the two countries. If the price of a basketball were $10 in the United States and $12 in Canada, the U.S.–Canada exchange rate would have to be $1 U.S. per $1.20 Canadian. If the rate were instead one-to-one, it would pay people to buy the balls in the United States and sell them in Canada. This would increase the demand for U.S. dollars in Canada, thereby driving up their price in terms of Canadian dollars to $1 U.S. per $1.2 Canadian, at which point no one could make a profit shipping basketballs across international lines and the process would cease.  

The theory that exchange rates will adjust so that the price of similar goods in different countries is the same is known as the **purchasing-power-parity theory**. According to this theory, if it takes 10 times as many Mexican pesos to buy a pound of salt in Mexico as it takes U.S. dollars to buy a pound of salt in the United States, the equilibrium exchange rate should be 10 pesos per dollar.

In practice, transportation costs for many goods are quite large and the law of one price does not hold for these goods. (Haircuts are often cited as a good example. The transportation costs for a U.S. resident to get a British haircut are indeed large unless that person is an airline passenger.)

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4 Of course, if the rate were $1 U.S. to $2 Canadian, it would pay people to buy basketballs in Canada (at $12 Canadian, which is $6 U.S.) and sell them in the United States. This would weaken demand for the U.S. dollar, and its price would fall from $2 Canadian until it reached $1.20 Canadian.
Also, many products that are potential substitutes for each other are not precisely identical. For instance, a Rolls Royce and a Honda are both cars, but there is no reason to expect the exchange rate between the British pound and the yen to be set so that the prices of the two are equalized. In addition, countries consume different market baskets of goods, so we would not expect the aggregate price levels to follow the law of one price. Nevertheless, a high rate of inflation in one country relative to another puts pressure on the exchange rate between the two countries, and there is a general tendency for the currencies of relatively high-inflation countries to depreciate.

Figure 35.5 shows the adjustment likely to occur following an increase in the U.S. price level relative to the price level in Great Britain. This change in relative prices will affect citizens of both countries. Higher prices in the United States make imports relatively less expensive. U.S. citizens are likely to increase their spending on imports from Britain, shifting the demand for pounds to the right, from \(D_0\) to \(D_1\). At the same time, the British see U.S. goods getting more expensive and reduce their demand for exports from the United States. Consequently, the supply of pounds shifts to the left, from \(S_0\) to \(S_1\). The result is an increase in the price of pounds. Before the change in relative prices, 1 pound sold for $1.89; after the change, 1 pound costs $2.25. The pound appreciates, and the dollar depreciates.

**Relative Interest Rates**

Another factor that influences a country’s exchange rate is the level of its interest rate relative to other countries’ interest rates. If the interest rate is 6 percent in the United States and 8 percent in Great Britain, people with money to lend have an incentive to buy British securities instead of U.S. securities. Although it is sometimes difficult for individuals in one country to buy securities in another country, it is easy for international banks and investment companies to do so. If the interest rate is lower in the United States than in Britain, there will be a movement of funds out of U.S. securities into British securities as banks and firms move their funds to the higher-yielding securities.

How does a U.S. bank buy British securities? It takes its dollars, buys British pounds, and uses the pounds to buy the British securities. The bank’s purchase of pounds drives up the price of pounds in the foreign exchange market. The increased demand for pounds increases the price of the pound (and decreases the price of the dollar). A high interest rate in Britain relative to the interest rate in the United States tends to depreciate the dollar.

Figure 35.6 shows the effect of rising interest rates in the United States on the dollar–pound exchange rate. Higher interest rates in the United States attract British investors. To buy U.S. securities, the British need dollars. The supply of pounds (the demand for dollars) shifts to the right, from \(S_0\) to \(S_1\). The same relative interest rates affect the portfolio choices of U.S. banks, firms, and households. With higher interest rates at home, there is less incentive for U.S. residents to buy British securities. The demand for pounds drops at the same time the supply increases and the demand curve shifts to the left, from \(D_0\) to \(D_1\). The net result is a depreciating pound and an appreciating dollar. The price of pounds falls from $1.89 to $1.25.
The Effects of Exchange Rates on the Economy

We are now ready to discuss some of the implications of floating exchange rates. Recall, when exchange rates are fixed, households spend some of their incomes on imports and the multiplier is smaller than it would be otherwise. Otherwise, it is. Imports are a “leakage” from the circular flow, much like taxes and saving. Exports, in contrast, are an “injection” into the circular flow; they represent spending on U.S.-produced goods and services from abroad and can stimulate output.

The world is far more complicated when exchange rates are allowed to float. First, the level of imports and exports depends on exchange rates as well as on income and other factors. When events cause exchange rates to adjust, the levels of imports and exports will change. Changes in exports and imports can, in turn, affect the level of real GDP and the price level. Further, exchange rates themselves also adjust to changes in the economy. Suppose the government decides to stimulate the economy with an expansionary monetary policy. This will affect interest rates, which may affect exchange rates.

Exchange Rate Effects on Imports, Exports, and Real GDP

As we already know, when a country’s currency depreciates (falls in value), its import prices rise and its export prices (in foreign currencies) fall. When the U.S. dollar is cheap, U.S. products are more competitive with products produced in the rest of the world and foreign-made goods look expensive to U.S. citizens.

A depreciation of a country’s currency can serve as a stimulus to the economy. Suppose the U.S. dollar falls in value, as it did sharply between 1985 and 1988. If foreign buyers increase their spending on U.S. goods, and domestic buyers substitute U.S.-made goods for imports, aggregate expenditure on domestic output will rise, inventories will fall, and real GDP ($Y$) will increase. A depreciation of a country’s currency is likely to increase its GDP.5

Exchange Rates and the Balance of Trade: The J Curve

Because a depreciating currency tends to increase exports and decrease imports, you might think that it will also reduce a country’s trade deficit. In fact, the effect of a depreciation on the balance of trade is ambiguous.

Many economists believe that when a currency starts to depreciate, the balance of trade is likely to worsen for the first few quarters (perhaps three to six). After that, the balance of trade may improve. This effect is graphed in Figure 35.7. The curve in this figure resembles the letter J, and the movement in the balance of trade that it describes is sometimes called the J-curve effect. The point of the J shape is that the balance of trade gets worse before it gets better following a currency depreciation.

J-curve effect

Following a currency depreciation, a country’s balance of trade may get worse before it gets better. The graph showing this effect is shaped like the letter J, hence the name J-curve effect.

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5 For this reason, some countries are tempted at times to intervene in foreign exchange markets, deprecate their currencies, and stimulate their economies. If all countries attempted to lower the value of their currencies simultaneously, there would be no gain in income for any of them. Although the exchange rate system at the time was different, such a situation actually occurred during the early years of the Great Depression. Many countries practiced so-called beggar-thy-neighbor policies of competitive devaluations in a desperate attempt to maintain export sales and employment.
ECONOMICS IN PRACTICE

China’s Increased Flexibility

As we indicate in the text, most economies in the world operate with flexible exchange rates so that the value of a dollar relative to the euro, for example, is set in the market and reflects the underlying markets for goods and services. One exception among the major trading countries has been China, whose government has acted to keep the value of its currency, the yuan, stable and relatively low. An undervalued yuan, of course, increases demand for Chinese goods from abroad, but it also hurts the Chinese population by making foreign goods more expensive. In the late spring of 2010, after much pressure from its trading partners, the Chinese government announced that it would make the yuan more flexible. The article below provides the views of one central banker in China on this move. Notice the link in Ms. Hu’s discussion to China’s current account position.

China Warns on Currency Moves

The Wall Street Journal

SHANGHAI—A Chinese central banker said Saturday that large foreign-exchange rate fluctuations are harmful to the economy. Her comments follow the central bank’s decision last month to allow more flexibility in exchange rates.

Hu Xiaolian, a vice governor of the People’s Bank of China, also said that a country’s current-account position is a good gauge of whether its currency is undervalued or overvalued, and that China’s current-account position is gradually becoming balanced, signaling the central bank may not stomach much appreciation in the yuan.

“How does the J curve come about? Recall that the balance of trade is equal to export revenue minus import costs, including exports and imports of services:

\[ \text{balance of trade} = \text{dollar price of exports} \times \text{quantity of exports} - \text{dollar price of imports} \times \text{quantity of imports} \]

A currency depreciation affects the items on the right side of this equation as follows: First, the quantity of exports increases and the quantity of imports decreases; both have a positive effect on the balance of trade (lowering the trade deficit or raising the trade surplus). Second, the dollar price of exports is not likely to change very much, at least not initially. The dollar price of exports changes...
when the U.S. price level changes, but the initial effect of a depreciation on the domestic price level is not likely to be large. Third, the dollar price of imports increases. Imports into the United States are more expensive because $1 U.S. buys fewer yen, euros, and so on, than before. An increase in the dollar price of imports has a negative effect on the balance of trade.

An example to clarify this last point follows: The dollar price of a Japanese car that costs 1,200,000 yen rises from $10,000 to $12,000 when the exchange rate moves from 120 yen per dollar to 100 yen per dollar. After the currency depreciation, the United States ends up spending more (in dollars) for the Japanese car than it did before. Of course, the United States will end up buying fewer Japanese cars than it did before. Does the number of cars drop enough so that the quantity effect is bigger than the price effect or vice versa? Does the value of imports increase or decrease?

The net effect of a depreciation on the balance of trade could go either way. The depreciation stimulates exports and cuts back imports, but it also increases the dollar price of imports. It seems that the negative effect dominates initially. The impact of a depreciation on the price of imports is generally felt quickly, while it takes time for export and import quantities to respond to price changes. In the short run, the value of imports increases more than the value of exports, so the balance of trade worsens. The initial effect is likely to be negative, but after exports and imports have had time to respond, the net effect turns positive. The more elastic the demand for exports and imports, the larger the eventual improvement in the balance of trade.

Exchange Rates and Prices The depreciation of a country’s currency tends to increase its price level. There are two reasons for this effect. First, when a country’s currency is less expensive, its products are more competitive on world markets, so exports rise. In addition, domestic buyers tend to substitute domestic products for the now-more-expensive imports. This means that planned aggregate expenditure on domestically produced goods and services rises and that the aggregate demand curve shifts to the right. The result is a higher price level, a higher output, or both. (You may want to draw an AS/AD diagram to verify this outcome.) If the economy is close to capacity, the result is likely to be higher prices. Second, a depreciation makes imported inputs more expensive. If costs increase, the aggregate supply curve shifts to the left. If aggregate demand remains unchanged, the result is an increase in the price level.

Monetary Policy with Flexible Exchange Rates Let us now put everything in this chapter together and consider what happens when monetary policy is used first to stimulate the economy and then to contract the economy.

Suppose the economy is below full employment and the Federal Reserve (Fed) decides to expand the money supply. The volume of reserves in the system is expanded, perhaps through open market purchases of U.S. government securities by the Fed. The result is a decrease in the interest rate. The lower interest rate stimulates planned investment spending and consumption spending.

This added spending causes inventories to be lower than planned and aggregate output (income) \( Y \) to rise, but there are two additional effects: (1) The lower interest rate has an impact in the foreign exchange market. A lower interest rate means a lower demand for U.S. securities by foreigners, so the demand for dollars drops. (2) U.S. investment managers will be more likely to buy foreign securities (which are now paying relatively higher interest rates), so the supply of dollars rises. Both events push down the value of the dollar.

A cheaper dollar is a good thing if the goal of the monetary expansion is to stimulate the domestic economy because a cheaper dollar means more U.S. exports and fewer imports. If consumers substitute U.S.-made goods for imports, both the added exports and the decrease in imports mean more spending on domestic products, so the multiplier actually increases.

Now suppose inflation is a problem and the Fed wants to slow it down with tight money. Here again, floating exchange rates help. Tight monetary policy works through a higher interest rate. A higher interest rate lowers investment and consumption spending, reducing aggregate expenditure, reducing output, and lowering the price level. The higher interest rate also attracts foreign buyers into U.S. financial markets, driving up the value of the dollar, which reduces the price of imports. The reduction in the price of imports causes a shift of the aggregate supply curve to the right, which helps fight inflation.
In 1999 the European Central Bank (ECB) was created and a common currency for much of Europe, the euro, was introduced. Countries across Europe, from Germany and France to Italy, Spain, and Portugal, dismantled their own monetary authorities, turning their central banks into research institutions, and ceded control over monetary policy to the ECB.

As the article below suggests, the recession that began in 2008 has proven to be a tough test for the ECB as it has tried to fashion monetary policy for a set of nations whose economies differ in many ways, including fiscal discipline. With a common currency, problems with Greek debt (no longer denominated in drachma, but in euros) have substantial effects on stronger economies like Germany’s.

**Euro Trips Amid Identity Crisis**

*The Wall Street Journal*

After a tumultuous first six months of 2010, currency markets head into the second half with significant question marks about Europe continuing to dominate the outlook.

As Greece was hit with protests over austerity measures, the European Central Bank tried to allay concerns about the euro. During the second quarter, the euro faced its biggest test in its relatively brief life as the Greek debt crisis threatened to tear apart the European Union. As investors question the viability of the common currency, the euro was sent into a tailspin that by early June amounted to an 11% decline against the U.S. dollar from the end of March. At one point, the euro came within shouting distance of the $1.18 at which it exited the first day of trading when it was introduced in 1999.

For several weeks in June, the euro rebounded following belated but still significant steps by the European Central Bank and European governments to help Greece avoid default and provide some support for other heavily indebted countries. But in the final days of the quarter the euro collapsed anew, ending the second quarter at $1.2386, down 8.3% since the end of March and off 18% from an all-time high of $1.5144 hit just last November.

Few in the currency market believe the coast is clear for Europe.

Investors remain skeptical of European countries’ abilities to solve budget-deficit woes in a slow-growth environment. In addition, the crisis showed cracks in the basic structure of the European Union when it came to fiscal policies, solutions to which will require agreement among the bloc’s fractious governments.

**Fiscal Policy with Flexible Exchange Rates**

The openness of the economy and flexible exchange rates do not always work to the advantage of policy makers. Consider a policy of cutting taxes to stimulate the economy. Suppose Congress enacts a major tax cut designed to raise output. Spending by households rises, but not all this added spending is on domestic products—some leaks out of the U.S. economy, reducing the multiplier.

As income rises, so does the demand for money ($M^d$)—not the demand for dollars in the foreign exchange market, but the amount of money people want to hold for transactions. Unless the Fed is fully accommodating, the interest rate will rise. A higher interest rate tends to attract foreign demand for U.S. securities. This rise in demand tends to drive the price of the dollar up, which further blunts the effectiveness of the tax cut. If the value of the dollar rises, U.S. exports are less competitive in world markets and the quantity of exports will decline. Similarly, a strong dollar makes imported goods look cheaper and U.S. citizens spend more on foreign goods and less on U.S. goods, an effect that again reduces the multiplier.

There is another caveat to the multiplier story of Chapters 23 and 24. Without a fully accommodating Fed, three factors work to reduce the multiplier: (1) A higher interest rate from the increase in money demand may crowd out private investment and consumption; (2) some of the
increase in income from the expansion will be spent on imports; and (3) a higher interest rate may cause the dollar to appreciate, discouraging exports and further encouraging imports.

**Monetary Policy with Fixed Exchange Rates** Although most major countries in the world today have a flexible exchange rate (counting for this purpose the euro zone countries as one country), it is interesting to ask what role monetary policy can play when a country has a fixed exchange rate. The answer is, no role. For a country to keep its exchange rate fixed to, say, the U.S. dollar, its interest rate cannot change relative to the U.S. interest rate. If the monetary authority of the country lowered the interest rate because it wanted to stimulate the economy, the country’s currency would depreciate (assuming the U.S. interest rate did not change). People would want to sell the country’s currency and buy dollars and invest in U.S. securities because the country’s interest rate would have fallen relative to the U.S. interest rate. In other words, the monetary authority cannot change its interest rate relative to the U.S. interest rate without having its exchange rate change. The monetary authority is at the mercy of the United States, and it has no independent way of changing its interest rate if it wants to keep its exchange rate fixed to the dollar.

When the various European countries moved in 1999 to a common currency, the euro, each country gave up its monetary policy. Monetary policy is decided for all of the euro zone countries by the European Central Bank (ECB). The Bank of Italy, for example, no longer has any influence over Italian interest rates. Interest rates are influenced by the ECB. This is the price Italy paid for giving up the lira. See the Economics in Practice, “Losing Monetary Policy Control,” on p. 704 for problems that may arise when there is a common currency.

The one case in which a country can change its interest rate and keep its exchange rate fixed is if it imposes capital controls. Imposing capital controls means that the country limits or prevents people from buying or selling its currency in the foreign exchange markets. A citizen of the country may be prevented, for example, from using the country’s currency to buy dollars. The problem with capital controls is that they are hard to enforce, especially for large countries and for long periods of time.

**An Interdependent World Economy**

The increasing interdependence of countries in the world economy has made the problems facing policy makers more difficult. We used to be able to think of the United States as a relatively self-sufficient region. Forty years ago economic events outside U.S. borders had relatively little effect on its economy. This situation is no longer true. The events of the past four decades have taught us that the performance of the U.S. economy is heavily dependent on events outside U.S. borders.

This chapter and the previous chapter have provided only the bare bones of open-economy macroeconomics. If you continue your study of economics, more will be added to the basic story we have presented. The next chapter concludes with a discussion of the problems of developing countries.

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**SUMMARY**

1. The main difference between an international transaction and a domestic transaction concerns currency exchange: When people in different countries buy from and sell to each other, an exchange of currencies must also take place.

2. The exchange rate is the price of one country’s currency in terms of another country’s currency.

**THE BALANCE OF PAYMENTS**

3. Foreign exchange is all currencies other than the domestic currency of a given country. The record of a nation’s transactions in goods, services, and assets with the rest of the world is its balance of payments. The balance of payments is also the record of a country’s sources (supply) and uses (demand) of foreign exchange.

**EQUILIBRIUM OUTPUT (INCOME) IN AN OPEN ECONOMY**

4. In an open economy, some income is spent on foreign produced goods instead of domestically produced goods. To measure planned domestic aggregate expenditure in an open economy, we add total exports but subtract total imports: $C + I + G + EX - IM$. The open economy is in equilibrium when domestic aggregate output (income) ($Y$) equals planned aggregate expenditure.

5. In an open economy, the multiplier equals $1 / [1 - (MPC - MPM)]$, where $MPC$ is the marginal propensity to consume and $MPM$ is the marginal propensity to import. The marginal propensity to import is the change in imports caused by a $1$ change in income.
6. In addition to income, other factors that affect the level of imports are the after-tax real wage rate, after-tax nonlabor income, interest rates, and relative prices of domestically produced and foreign-produced goods. The demand for exports is determined by economic activity in the rest of the world and by relative prices.

7. An increase in U.S. economic activity leads to a worldwide increase in economic activity, which then "feeds back" to the United States. An increase in U.S. imports increases other countries' exports, which stimulates economies and increases their imports, which increases U.S. exports, which stimulates the U.S. economy and increases its imports, and so on. This is the *trade feedback effect*.

8. Export prices of other countries affect U.S. import prices. The general rate of inflation abroad is likely to affect U.S. import prices. If the inflation rate abroad is high, U.S. import prices are likely to rise.

9. Because one country's exports are another country's imports, an increase in export prices increases other countries' import prices. An increase in other countries' import prices leads to an increase in their domestic prices—and their export prices. In short, export prices affect import prices and vice versa. This *price feedback effect* shows that inflation is "exportable," an increase in the price level in one country can drive up prices in other countries, making inflation in the first country worse.

### THE OPEN ECONOMY WITH FLEXIBLE EXCHANGE RATES p. 696

10. The equilibrium exchange rate occurs when the quantity demanded of a foreign currency in the foreign exchange market equals the quantity of that currency supplied in the foreign exchange market.

11. *Depreciation of a currency occurs* when a nation's currency falls in value relative to another country's currency. *Appreciation of a currency occurs* when a nation's currency rises in value relative to another country's currency.

12. According to the *law of one price*, if the costs of transportation are small, the price of the same good in different countries should be roughly the same. The theory that exchange rates are set so that the price of similar goods in different countries is the same is known as the *purchasing-power-parity* theory. In practice, transportation costs are significant for many goods, and the law of one price does not hold for these goods.

13. A high rate of inflation in one country relative to another country puts pressure on the exchange rate between the two countries. There is a general tendency for the currencies of relatively high-inflation countries to depreciate.

14. A depreciation of the dollar tends to increase U.S. GDP by making U.S. exports cheaper (hence, more competitive abroad) and by making U.S. imports more expensive (encouraging consumers to switch to domestically produced goods and services).

15. The effect of a depreciation of a nation's currency on its balance of trade is unclear. In the short run, a currency depreciation may increase the balance-of-trade deficit because it raises the price of imports. Although this price increase causes a decrease in the quantity of imports demanded, the impact of a depreciation on the price of imports is generally felt quickly, but it takes time for export and import quantities to respond to price changes. The initial effect is likely to be negative, but after exports and imports have had time to respond, the net effect turns positive. The tendency for the balance-of-trade deficit to widen and then to decrease as the result of a currency depreciation is known as the *J-curve effect*.

16. The depreciation of a country's currency tends to raise its price level for two reasons. First, a currency depreciation increases planned aggregate expenditure, an effect that shifts the aggregate demand curve to the right. If the economy is close to capacity, the result is likely to be higher prices. Second, a depreciation makes imported inputs more expensive. If costs increase, the aggregate supply curve shifts to the left. If aggregate demand remains unchanged, the result is an increase in the price level.

17. When exchange rates are flexible, a U.S. expansionary monetary policy decreases the interest rate and stimulates planned investment and consumption spending. The lower interest rate leads to a lower demand for U.S. securities by foreigners and a higher demand for foreign securities by U.S. investment-fund managers. As a result, the dollar depreciates. A U.S. contractionary monetary policy appreciates the dollar.

18. Flexible exchange rates do not always work to the advantage of policy makers. An expansionary fiscal policy can appreciate the dollar and work to reduce the multiplier.

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**REVIEW TERMS AND CONCEPTS**

- appreciation of a currency, p. 698
- balance of payments, p. 688
- balance of trade, p. 689
- balance on capital account, p. 690
- balance on current account, p. 689
- depreciation of a currency, p. 698
- exchange rate, p. 687
- floating, or market-determined, exchange rates, p. 696
- foreign exchange, p. 688
- J-curve effect, p. 701
- law of one price, p. 699
- marginal propensity to import (MPM), p. 692
- net exports of goods and services 
  
  \[ EX - IM \]
  
  p. 692
- price feedback effect, p. 696
- purchasing-power-parity theory, p. 699
- trade deficit, p. 689
- trade feedback effect, p. 694
- Planned aggregate expenditure in an open economy:
  
  \[ AE = C + I + G + EX - IM \]
  
  Open-economy multiplier =

  \[
  \frac{1}{1 - (MPC - MPM)}
  \]
1. In August 2010, the euro was trading at $1.28. Check the Internet or any daily newspaper to see what the “price” of a euro is today. What explanations can you give for the change? Make sure you check what has happened to interest rates and economic growth.

2. Suppose the following graph shows what prevailed on the foreign exchange market in 2010 with floating exchange rates.
   a. Name three phenomena that might shift the demand curve to the right.
   b. Which, if any, of these three phenomena might cause a simultaneous shift of the supply curve to the left?
   c. What effects might each of the three phenomena have on the balance of trade if the exchange rate floats?

3. Obtain a recent issue of The Economist. Turn to the section entitled “Financial Indicators.” Look at the table entitled “Trade, exchange rates and budgets.” Which country had the largest trade deficit over the last year and during the last month? Which country had the largest trade surplus over the last year and during the last month? How does the current account deficit/surplus compare to the overall trade balance? How can you explain the difference?

4. The exchange rate between the U.S. dollar and the Japanese yen is floating freely—both governments do not intervene in the market for each currency. Suppose a large trade deficit with Japan prompts the United States to impose quotas on certain Japanese products imported into the United States and, as a result, the quantity of these imports falls.
   a. The decrease in spending on Japanese products increases spending on U.S.-made goods. Why? What effect will this have on U.S. output and employment and on Japanese output and employment?
   b. What happens to U.S. imports from Japan when U.S. output (or income) rises? If the quotas initially reduce imports from Japan by $25 billion, why is the final reduction in imports likely to be less than $25 billion?
   c. Suppose the quotas do succeed in reducing imports from Japan by $15 billion. What will happen to the demand for yen? Why?
   d. What will happen to the dollar–yen exchange rate? Why? (Hint: There is an excess supply of yen, or an excess demand for dollars.) What effects will the change in the value of each currency have on employment and output in the United States? What about the balance of trade? (Ignore complications such as the J curve.)
   e. Considering the macroeconomic effects of a quota on Japanese imports, could a quota reduce employment and output in the United States? have no effect at all? Explain.

5. What effect will each of the following events have on the current account balance and the exchange rate if the exchange rate is fixed? if the exchange rate is floating?
   a. The U.S. government cuts taxes and income rises.
   b. The U.S. inflation rate increases, and prices in the United States rise faster than those in countries with which the United States trades.
   c. The United States adopts an expansionary monetary policy. Interest rates fall (and are now lower than those in other countries) and income rises.
   d. The textile companies’ “Buy American” campaign is successful, and U.S. consumers switch from purchasing imported products to buying products made in the United States.

6. You are given the following model that describes the economy of Hypothetica.
   (1) Consumption function: \( C = 100 + .8Y_d \)
   (2) Planned investment: \( I = 38 \)
   (3) Government spending: \( G = 75 \)
   (4) Exports: \( EX = 25 \)
   (5) Imports: \( IM = .05 Y_d \)
   (6) Disposable income: \( Y_d = Y - T \)
   (7) Taxes: \( T = 40 \)
   (8) Planned aggregate expenditure:
   \[ AE = C + I + G + EX - IM \]
   a. What is equilibrium income in Hypothetica? What is the government deficit? What is the current account balance?
   b. If government spending is increased to \( G = 80 \), what happens to equilibrium income? Explain using the government spending multiplier. What happens to imports?
   c. Now suppose the amount of imports is limited to \( IM = 40 \) by a quota on imports. If government spending is again increased from 75 to 80, what happens to equilibrium income? Explain why the same increase in \( G \) has a bigger effect on income in the second case. What is it about the presence of imports that changes the value of the multiplier?
   d. If exports are fixed at \( EX = 25 \), what must income be to ensure a current account balance of zero? (Hint: Imports depend on income, so what must income be for imports to be equal to exports?) By how much must we cut government spending to balance the current account? (Hint: Use your answer to the first part of this question to determine how much of a decrease in income is needed. Then use the multiplier to calculate the decrease in \( G \) needed to reduce income by that amount.)

7. [Related to the Economics in Practice on p. 702] Go to www.federalreserve.gov and under Recent Statistical Releases, click on “Foreign Exchange Rates.” Click on “Historical data” to find the exchange rates between the U.S. dollar and the euro, the Canadian dollar, the Japanese yen, and the Chinese yuan at the beginning of 2008 and at the end of 2008. Did the U.S. dollar appreciate or depreciate against these currencies during 2008? Go to www.census.gov and find the value of U.S. exports, imports and the U.S trade balance at the beginning of 2008 and at the end of 2008. Did these values increase or decrease during 2008? Explain how the changes in the exchange rates may have had an impact on the changes in U.S. exports, imports and the trade balance.
CHAPTER 35 APPENDIX

World Monetary Systems Since 1900

Since the beginning of the twentieth century, the world has operated under a number of different monetary systems. This Appendix provides a brief history of each and a description of how they worked.

The Gold Standard

The gold standard was the major system of exchange rate determination before 1914. All currencies were priced in terms of gold—an ounce of gold was worth so much in each currency. When all currencies exchanged at fixed ratios to gold, exchange rates could be determined easily. For instance, 1 ounce of gold was worth $20 U.S.; that same ounce of gold exchanged for £4 (British pounds). Because $20 and £4 were each worth 1 ounce of gold, the exchange rate between dollars and pounds was $20/£4, or $5 to £1.

For the gold standard to be effective, it had to be backed up by the country's willingness to buy and sell gold at the determined price. As long as countries maintain their currencies at a fixed value in terms of gold and as long as each country is willing to buy and sell gold, exchange rates are fixed. If at the given exchange rate the number of U.S. citizens who want to buy things produced in Great Britain is equal to the number of British citizens who want to buy things produced in the United States, the currencies of the two countries will simply be exchanged. What if U.S. citizens suddenly decide they want to drink imported Scotch instead of domestic bourbon? If the British do not have an increased desire for U.S. goods, they will still accept U.S. dollars because those dollars can be redeemed in gold. This gold can then be immediately turned into pounds.

As long as a country's overall balance of payments remained in balance, no gold would enter or leave the country and the economy would be in equilibrium. If U.S. citizens bought more from the British than the British bought from the United States, however, the U.S. balance of payments would be in deficit and the U.S. stock of gold would begin to fall. Conversely, Britain would start to accumulate gold because it would be exporting more than it spent on imports.

8. Suppose the exchange rate between the Mexican peso and the U.S. dollar is 12 MXN = $1 and the exchange rate between the Hungarian forint and the U.S. dollar is 215 FNT = $1.
   a. Express both of these exchange rates in terms of dollars per unit of the foreign currency.
   b. What should the exchange rate be between the Mexican peso and the Hungarian forint? Express the exchange rate in terms of 1 peso and in terms of 1 forint.
   c. Suppose the exchange rate between the peso and the dollar changes to 9 MXN = $1 and the exchange rate between the forint and the dollar changes to 240 FNT = $1. For each of the three currencies, explain whether the currency has appreciated or depreciated against the other two currencies.

9. Suppose the exchange rate between the British pound and the U.S. dollar is £1 = $1.50.
   a. Draw a graph showing the demand and supply of pounds for dollars.
   b. If the Bank of England implements a contractionary monetary policy, explain what will happen to the exchange rate between the pound and the dollar and show this on a graph. Has the dollar appreciated or depreciated relative to the pound? Explain.
   c. If the U.S. government implements an expansionary fiscal policy, explain what will happen to the exchange rate between the pound and the dollar and show this on a graph. Has the dollar appreciated or depreciated relative to the pound? Explain.

10. Canada is the largest trading partner for the United States. In 2009, U.S. exports to Canada were more than $171 billion and imports from Canada totaled more than $224 billion. On January 1, 2009, the exchange rate between the Canadian dollar and the U.S. dollar was 1.224 Canadian dollars = 1 U.S. dollar. On January 1, 2010, the exchange rate was 1.05 Canadian dollars = 1 U.S. dollar. Explain how this change in exchange rates could impact U.S. consumers and firms?

11. [Related to the Economics in Practice on p. 691] The United States is the largest oil importer in the world, importing an average of 11.7 million barrels of crude oil per day in 2009. According to the Economics in Practice article, France's trade deficit fell in 2009 as a result of lower oil prices. Go to www.inflationdata.com to look up crude oil prices for the past 10 years; then go to www.census.gov to look up the U.S. trade balance for the past 10 years. Does there appear to be a relationship between the price of crude oil and the U.S. trade balance? Briefly explain the results of your findings.

12. [Related to the Economics in Practice on p. 695] The Economics in Practice article states that trade between developed nations fell in the last quarter of 2008, with the value of exports and imports of goods and services falling 18.5 percent and 18.6 percent, respectively, from the previous quarter. Search the Internet for export and import data since 2008 for developed nations. By how much have the values of these exports and imports increased or decreased since 2008? Explain if the changes in the values reflect the trade feedback effect.

13. [Related to the Economics in Practice on p. 704] Explain why the European Central Bank cannot selectively change interest rates in any of the 16 EU countries that have adopted the euro—for example, lowering the interest rate to stimulate the economies of Greece, Ireland, or Spain, while maintaining the interest rate in other countries?
Under the gold standard, gold was a big determinant of the money supply. An inflow of gold into a country caused that country’s money supply to expand, and an outflow of gold caused that country’s money supply to contract. If gold were flowing from the United States to Great Britain, the British money supply would expand and the U.S. money supply would contract.

Now recall from earlier chapters the impacts of a change in the money supply. An expanded money supply in Britain will lower British interest rates and stimulate aggregate demand. As a result, aggregate output (income) and the price level in Britain will increase. Higher British prices will discourage U.S. citizens from buying British goods. At the same time, British citizens will have more income and will face relatively lower import prices, causing them to import more from the States.

On the other side of the Atlantic, U.S. citizens will face a contracting domestic money supply. This will cause higher interest rates, declining aggregate demand, lower prices, and falling output (income). The effect will be lower demand in the United States for British goods. Thus, changes in relative prices and incomes that resulted from the inflow and outflow of gold would automatically bring trade back into balance.

Problems with the Gold Standard

Two major problems were associated with the gold standard. First, the gold standard implied that a country had little control over its money supply. The reason, as we have just seen, is that the money stock increased when the overall balance of payments was in surplus (gold inflow) and decreased when the overall balance was in deficit (gold outflow). A country that was experiencing a balance-of-payments deficit could correct the problem only by the painful process of allowing its money supply to contract. This contraction brought on a slump in economic activity, a slump that would eventually restore balance-of-payments equilibrium, but only after reductions in income and employment. Countries could (and often did) act to protect their gold reserves, and this precautionary step prevented the adjustment mechanism from correcting the deficit.

Making the money supply depend on the amount of gold available had another disadvantage. When major new gold fields were discovered (as in California in 1849 and South Africa in 1886), the world’s supply of gold (and therefore of money) increased. The price level rose and income increased. When no new gold was discovered, the supply of money remained unchanged and prices and income tended to fall.

When President Reagan took office in 1981, he established a commission to consider returning the nation to the gold standard. The final commission report recommended against such a move. An important part of the reasoning behind this recommendation was that the gold standard puts enormous economic power in the hands of gold-producing nations.

Fixed Exchange Rates and the Bretton Woods System

As World War II drew to a close, a group of economists from the United States and Europe met to formulate a new set of rules for exchange rate determination that they hoped would avoid the difficulties of the gold standard. The rules they designed became known as the Bretton Woods system, after the town in New Hampshire where the delegates met. The Bretton Woods system was based on two (not necessarily compatible) premises. First, countries were to maintain fixed exchange rates with one another. Instead of pegging their currencies directly to gold, however, currencies were fixed in terms of the U.S. dollar, which was fixed in value at $35 per ounce of gold. The British pound, for instance, was fixed at roughly $2.40, so that an ounce of gold was worth approximately £14.6. As we shall see, the pure system of fixed exchange rates would work in a manner very similar to the pre-1914 gold standard.

The second aspect of the Bretton Woods system added a new wrinkle to the operation of the international economy. Countries experiencing a “fundamental disequilibrium” in their balance of payments were allowed to change their exchange rates. (The term fundamental disequilibrium was necessarily vague, but it came to be interpreted as a large and persistent current account deficit.) Exchange rates were not really fixed under the Bretton Woods system; they were, as someone remarked, only “fixed until further notice.”

The point of allowing countries with serious current account problems to alter the value of their currency was to avoid the harsh recessions that the operation of the gold standard would have produced under these circumstances. However, the experience of the European economies in the years between World War I and World War II suggested that it might not be a good idea to give countries complete freedom to change their exchange rates whenever they wanted.

During the Great Depression, many countries undertook so-called competitive devaluations to protect domestic output and employment. That is, countries would try to encourage exports—a source of output growth and employment—by attempting to set as low an exchange rate as possible, thereby making their exports competitive with foreign-produced goods. Unfortunately, such policies had a built-in flaw. A devaluation of the pound against the French franc might help encourage British exports to France, but if those additional British exports cut into French output and employment, France would likely respond by devaluing the franc against the pound, a move that, of course, would undo the effects of the pound’s initial devaluation.

To solve this exchange rate rivalry, the Bretton Woods agreement created the International Monetary Fund (IMF). Its job was to assist countries experiencing temporary current

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1 In the days when currencies were tied to gold, changes in the amount of gold influenced the supply of money in two ways. A change in the quantity of gold coins in circulation had a direct effect on the supply of money; indirectly, gold served as a backing for paper currency. A decrease in the central bank’s gold holdings meant a decline in the amount of paper money that could be supported.
account problems. It was also supposed to certify that a “fundamental disequilibrium” existed before a country was allowed to change its exchange rate. The IMF was like an international economic traffic cop whose job was to ensure that all countries were playing the game according to the agreed-to rules and to provide emergency assistance where needed.

“Pure” Fixed Exchange Rates

Under a pure fixed exchange rate system, governments set a particular fixed rate at which their currencies will exchange for one another and then commit themselves to maintaining that rate. A true fixed exchange rate system is like the gold standard in that exchange rates are supposed to stay the same forever. Because currencies are no longer backed by gold, they have no fixed, or standard, value relative to one another. There is, therefore, no automatic mechanism to keep exchange rates aligned with each other, as with the gold standard.

The result is that under a pure fixed exchange rate system, governments must at times intervene in the foreign exchange market to keep currencies aligned at their established values. Economists define government intervention in the foreign exchange market as the buying or selling of foreign exchange for the purpose of manipulating the exchange rate. What kind of intervention is likely to occur under a fixed exchange rate system, and how does it work?

We can see how intervention works by looking at Figure 35A.1. Initially, the market for Australian dollars is in equilibrium. At the fixed exchange rate of 0.96, the supply of Australian dollars is exactly equal to the demand for dollars. No government intervention is necessary to maintain the exchange rate at this level. Now suppose Australian wines are found to be contaminated with antifreeze and U.S. citizens switch to California wines. This substitution away from the Australian product shifts the U.S. demand curve for Australian dollars to the left: The United States demands fewer Australian dollars at every exchange rate (cost of an Australian dollar) because it is purchasing less from Australia than it did before.

If the price of Australian dollars were set in a completely unfettered market, the shift in the demand curve would lead to a fall in the price of Australian dollars, just the way the price of wheat would fall if there was an excess supply of wheat. Remember, the Australian and U.S. governments have committed themselves to maintaining the rate at 0.96. To do so, either the U.S. government or the Australian government (or both) must buy up the excess supply of Australian dollars to keep its price from falling. In essence, the fixed exchange rate policy commits governments to making up any difference between the supply of a currency and the demand so as to keep the price of the currency (exchange rate) at the desired level. The government promises to act as the supplier (or demander) of last resort, who will ensure that the amount of foreign exchange demanded by the private sector will equal the supply at the fixed price.

Problems with the Bretton Woods System

As it developed after the end of World War II, the system of more-or-less fixed exchange rates had some flaws that led to its abandonment in 1971.

First, there was a basic asymmetry built into the rules of international finance. Countries experiencing large and persistent current account deficits—what the Bretton Woods agreements termed “fundamental disequilibria”—were obliged to devalue their currencies and/or take measures to cut their deficits by contracting their economies. Both of these alternatives were unpleasant because devaluation meant rising prices and contraction meant rising unemployment. However, a country with a current account deficit had no choice because it was losing stock of foreign exchange reserves. When its stock of foreign currencies became exhausted, it had to change its exchange rate because further intervention (selling off some of its foreign exchange reserves) became impossible.

Countries experiencing current account surpluses were in a different position because they were gaining foreign exchange reserves. Although these countries were supposed to stimulate their economies and/or revalue their currencies to restore balance to their current account, they were not obliged to do so. They could easily maintain their fixed exchange rate by buying up any excess supply of foreign exchange with their own currency, of which they had plentiful supply.

In practice, this meant that some countries—especially Germany and Japan—tended to run large and chronic current account surpluses and were under no compulsion to take steps to correct the problem. The U.S. economy, stimulated by expenditures on the Vietnam War, experienced a large and
prolonged current account deficit (capital outflow) in the 1960s, which was the counterpart of these surpluses. The United States was, however, in a unique position under the Bretton Woods system. The value of gold was fixed in terms of the U.S. dollar at $35 per ounce of gold. Other countries fixed their exchange rates in terms of U.S. dollars (and therefore only indirectly in terms of gold). Consequently, the United States could never accomplish anything by devaluing its currency in terms of gold. If the dollar was devalued from $35 to $40 per ounce of gold, the yen, pegged at 200 yen per dollar, would move in parallel with the dollar (from 7,000 yen per ounce of gold to 8,000 yen per ounce), with the dollar–yen exchange rate unaffected. To correct its current account deficits vis-à-vis Japan and Germany, it would be necessary for those two countries to adjust their currencies’ exchange rates with the dollar. These countries were reluctant to do so for a variety of reasons. As a result, the U.S. current account was chronically in deficit throughout the late 1960s.

A second flaw in the Bretton Woods system was that it permitted devaluations only when a country had a “chronic” current account deficit and was in danger of running out of foreign exchange reserves. This meant that devaluations could often be predicted quite far in advance, and they usually had to be rather large if they were to correct any serious current account problem. The situation made it tempting for speculators to “attack” the currencies of countries with current account deficits.

Problems such as these eventually led the United States to abandon the Bretton Woods rules in 1971. The U.S. government refused to continue pegging the value of the dollar in terms of gold. Thus, the prices of all currencies were free to find their own levels.

The alternative to fixed exchange rates is a system that allows exchange rates to move freely or flexibly in response to market forces. Two types of flexible exchange rate systems are usually distinguished. In a freely floating system, governments do not intervene at all in the foreign exchange market. They do not buy or sell currencies with the aim of manipulating the rates. In a managed floating system, governments intervene if markets are becoming “disorderly”—fluctuating more than a government believes is desirable. Governments may also intervene if they think a currency is increasing or decreasing too much in value even though the day-to-day fluctuations may be small.

Since the demise of the Bretton Woods system in 1971, the world’s exchange rate system has been one of managed floating. One of the important features of this system has been times of large fluctuations in exchange rates. For example, the yen–dollar rate went from 347 in 1971 to 210 in 1978, to 125 in 1988, and to 80 in 1995. Those are very large changes, changes that have important effects on the international economy, some of which we have covered in this text.

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**APPENDIX SUMMARY**

1. The gold standard was the major system of exchange rate determination before 1914. All currencies were priced in terms of gold. Difficulties with the gold standard led to the Bretton Woods agreement following World War II. Under this system, countries maintained fixed exchange rates with one another and fixed the value of their currencies in terms of the U.S. dollar. Countries experiencing a “fundamental disequilibrium” in their current accounts were permitted to change their exchange rates.

2. The Bretton Woods system was abandoned in 1971. Since then, the world’s exchange rate system has been one of managed floating rates. Under this system, governments intervene if foreign exchange markets are fluctuating more than the government thinks desirable.

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**APPENDIX PROBLEMS**

1. The currency of Atlantis is the wimp. In 2010, Atlantis developed a balance-of-payments deficit with the United States as a result of an unanticipated decrease in exports; U.S. citizens cut back on the purchase of Atlantean goods. Assume Atlantis is operating under a system of fixed exchange rates.
   a. How does the drop in exports affect the market for wimps? Identify the deficit graphically.
   b. How must the government of Atlantis act (in the short run) to maintain the value of the wimp?
   c. If originally Atlantis had been operating at full employment (potential GDP), what impact would those events have had on its economy? Explain your answer.
   d. The chief economist of Atlantis suggests an expansionary monetary policy to restore full employment; the secretary of commerce suggests a tax cut (expansionary fiscal policy). Given the fixed exchange rate system, describe the effects of these two policy options on Atlantis’s current account.
   e. How would your answers to a, b, and c change if the two countries operated under a floating rate system?
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Our primary focus in this text has been on countries with modern industrialized economies that rely heavily on markets to allocate resources, but what about the economic problems facing countries such as Somalia and Haiti? Can we apply the same economic principles that we have been studying to these less developed nations?

Yes. All economic analysis deals with the problem of making choices under conditions of scarcity, and the problem of satisfying people’s wants and needs is as real for Somalia and Haiti as it is for the United States, Germany, and Japan. The universality of scarcity is what makes economic analysis relevant to all nations, regardless of their level of material well-being or ruling political ideology.

The basic tools of supply and demand, theories about consumers and firms, and theories about the structure of markets all contribute to an understanding of the economic problems confronting the world’s developing nations. However, these nations often face economic problems quite different from those that richer, more developed countries face. In developing nations, an economist may have to worry about chronic food shortages, explosive population growth, and hyperinflations that reach triple, and even quadruple, digits. The United States and other industrialized economies rarely encounter such difficulties.

The instruments of economic management also vary from nation to nation. The United States has well-developed financial market institutions and a strong central bank (the Federal Reserve) through which the government can control the macroeconomy to some extent. Even limited intervention is impossible in some of the developing countries. In the United States, tax laws can be changed to stimulate saving, to encourage particular kinds of investments, or to redistribute income. In most developing countries, there are neither meaningful personal income taxes nor effective tax policies.
Even though economic problems and the policy instruments available to tackle them vary across nations, economic thinking about these problems can be transferred easily from one setting to another. In this chapter, we discuss several of the economic problems specific to developing nations in an attempt to capture some of the insights that economic analysis can offer.

Life in the Developing Nations: Population and Poverty

In 2010, the population of the world reached over 6.8 billion people. Most of the world’s more than 200 nations belong to the developing world, in which about three-fourths of the world’s population lives.

In the early 1960s, the nations of the world could be assigned rather easily to categories: The developed countries included most of Europe, North America, Japan, Australia, and New Zealand; the developing countries included the rest of the world. The developing nations were often referred to as the Third World to distinguish them from the Western industrialized nations (the First World) and the former Socialist bloc of Eastern European nations (the Second World).

In 2010, the world did not divide easily into three neat parts. Rapid economic progress brought some developing nations closer to developed economies. Countries such as Argentina and Chile, still considered to be “developing,” are often referred to as middle-income or newly industrialized countries. Other countries, such as those in much of sub-Saharan Africa and some in South Asia, have stagnated and fallen so far behind the economic advances of the rest of the world that the term Fourth World has been used to describe them. China and India, while usually labeled developing countries, are fast becoming economic superpowers. It is not clear yet where some of the republics of the former Soviet Union and other formerly Communist countries of Eastern Europe will end up. Production fell sharply in many of them in the early transition stage to a market economy. Post-2000, however, the Russian economy began growing more rapidly.

Although the countries of the developing world exhibit considerable diversity in both their standards of living and their particular experiences of growth, marked differences continue to separate them from the developed nations. The developed countries have a higher average level of material well-being (the amount of food, clothing, shelter, and other commodities consumed by the average person). Comparisons of gross national income (GNI) are often used as a crude index of the level of material well-being across nations. GNI is a new measure of a nation’s income, computed using a more accurate way of converting purchasing power into dollars. See Table 36.1, where GNI per-capita in the industrial

<table>
<thead>
<tr>
<th>Table 36.1 Indicators of Economic Development</th>
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<tr>
<td><strong>Country Group</strong></td>
</tr>
<tr>
<td>Low-income</td>
</tr>
<tr>
<td>Lower middle-income</td>
</tr>
<tr>
<td>Upper middle-income</td>
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<tr>
<td>High-income</td>
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</table>

market economies significantly exceeds GNI of both the low- and middle-income developing economies.

Other characteristics of economic development include improvements in basic health and education. The degree of political and economic freedom enjoyed by individual citizens might also be part of what it means to be a developed nation. Some of these criteria are easy to quantify. Table 36.1 presents data for different types of economies according to some of the more easily measured indexes of development. As you can see, the industrial market economies enjoy higher standards of living according to whatever indicator of development is chosen.

Behind these statistics lies the reality of the very difficult life facing the people of the developing world. For most people, meager incomes provide only the basic necessities. Many people share a small room, usually with an earthen floor and no sanitary facilities. The great majority of the population lives in rural areas where agricultural work is hard and extremely time-consuming. Productivity (output produced per worker) is low because household plots are small and only the crudest of farm implements are available. Low productivity means farm output per person is barely sufficient to feed a farmer’s own family. School-age children may receive some formal education, but illiteracy remains chronic for young and old. Infant mortality runs 20 times higher than in the United States. Although parasitic infections are common and debilitating, there is only one physician per 5,000 people. In addition, many developing nations are engaged in civil and external warfare.

Life in the developing nations is a continual struggle against the circumstances of poverty, and prospects for dramatic improvements in living standards for most people are dim. As with all generalizations, there are exceptions. Some nations are better off than others, and in any given nation an elite group always lives in considerable luxury. India is on the World Bank’s list of low-income countries, yet Mumbai, a state capital, is one of the top 10 centers of commerce in the world, home to Bollywood, the world’s largest film industry.

Poverty—not affluence—dominates the developing world. Recent studies suggest that 40 percent of the population of the developing nations has an annual income insufficient to provide for adequate nutrition. While the developed nations account for only about one-quarter of the world’s population, they are estimated to consume three-quarters of the world’s output. This leaves the developing countries with about three-fourths of the world’s people but only one-fourth of the world’s income. The simple result is that most of our planet’s population is poor.

In the United States in 2005, the poorest one-fifth (bottom 20 percent) of the families received 3.4 percent of total income; the richest one-fifth received 50 percent. Inequality in the world distribution of income is much greater. When we look at the world population, the poorest one-fifth of the families earns about .5 percent and the richest one-fifth earns 79 percent of total world income.

Economic Development: Sources and Strategies

Economists have been trying to understand economic growth and development since Adam Smith and David Ricardo in the eighteenth and nineteenth centuries, but the study of development economics as it applies to the developing nations has a much shorter history. The geopolitical struggles that followed World War II brought increased attention to the developing nations and their economic problems. During this period, the new field of development economics asked simply: Why are some nations poor and others rich? If economists could understand the barriers to economic growth that prevent nations from developing and the prerequisites that would help them to develop, economists could prescribe strategies for achieving economic advancement.
The Sources of Economic Development

Although a general theory of economic development applicable to all nations has not emerged, some basic factors that limit a poor nation’s economic growth have been suggested. These include insufficient capital formation, a shortage of human resources and entrepreneurial ability, and a lack of social overhead capital.

**Capital Formation**  
One explanation for low levels of output in developing nations is insufficient quantities of necessary inputs. Developing nations have diverse resource endowments—Congo, for instance, is abundant in natural resources, while Bangladesh is resource-poor. Almost all developing nations have a scarcity of capital relative to other resources, especially labor. The small stock of physical capital (factories, machinery, farm equipment, and other productive capital) constrains labor’s productivity and holds back national output.

Nevertheless, citing capital shortages as the cause of low productivity does not explain much. We need to know why capital is in such short supply in developing countries. There are many explanations. One, the **vicious-circle-of-poverty hypothesis**, suggests that a poor nation must consume most of its income just to maintain its already low standard of living. Consuming most of national income implies limited saving, and this implies low levels of investment. Without investment, the capital stock does not grow, the income remains low, and the vicious circle is complete. Poverty becomes self-perpetuating.

The difficulty with the vicious-circle argument is that if it were true, no nation would ever develop. Japanese GDP per capita in 1900 was well below that of many of today’s developing nations, yet today it is among the affluent, developed nations. Among the many nations with low levels of capital per capita, some—like China—have managed to grow and develop in the last 20 years, while others remain behind. In even the poorest countries, there remains some capital surplus that could be harnessed if conditions were right. Many current observers believe that scarcity of capital in some developing countries may have more to do with a lack of incentives for citizens to save and invest productively than with any absolute scarcity of income available for capital accumulation. Many of the rich in developing countries invest their savings in Europe or in the United States instead of in their own country, which may have a riskier political climate. Savings transferred to the United States do not lead to physical capital growth in the developing countries. The term **capital flight** refers to the fact that both human capital and financial capital (domestic savings) leave developing countries in search of higher expected rates of return elsewhere or returns with less risk. Government policies in the developing nations—including price ceilings, import controls, and even outright appropriation of private property—tend to discourage investment. There has been increased attention to the role that financial institutions, including accounting systems and property right rules, play in encouraging domestic capital formation.

Whatever the causes of capital shortages, it is clear that the absence of productive capital prevents income from rising in any economy. The availability of capital is a necessary, but not a sufficient, condition for economic growth. The landscape of the developing countries is littered with idle factories and abandoned machinery. Other ingredients are required to achieve economic progress.

**Human Resources and Entrepreneurial Ability**  
Capital is not the only factor of production required to produce output. Labor is equally important. First of all, to be productive, the workforce must be healthy. Disease today is the leading threat to development in much of the world. In 2009, more than 1 million people died of malaria, almost all of them in Africa. The Gates Foundation has targeted malaria eradication as one of its key goals in the next decade.
HIV/AIDS was still responsible for more than 2 million deaths in 2009, again mostly in Africa, and has left Africa with more than 14 million AIDS orphans. Iron deficiency and parasites sap the strength of many workers in the developing world.

Health is not the only issue. Look back at Table 36.1. You will notice that low-income countries lag behind high-income countries not only in health but also in literacy rates. To be productive, the workforce must be educated and trained. Basic literacy as well as specialized training in farm management, for example, can yield high returns to both the individual worker and the economy. Education has grown to become the largest category of government expenditure in many developing nations, in part because of the belief that human resources are the ultimate determinant of economic advance. Nevertheless, in many developing countries, many children, especially girls, receive only a few years of formal education.

Just as financial capital seeks the highest and safest return, so does human capital. Thousands of students from developing countries, many of whom were supported by their governments, graduate every year from U.S. colleges and universities. After graduation, these people face a difficult choice: to remain in the United States and earn a high salary or to return home and accept a job at a much lower salary. Many remain in the United States. This brain drain siphons off many of the most talented minds from developing countries.

It is interesting to look at what happens to the flow of educated workers as countries develop. Increasingly, students who have come from China and India to study are returning to their home countries eager to use their skills in their newly growing economies. The return flow of this human capital stimulates growth and is a signal that growth is occurring. Indeed, development economists have found evidence that in India, schooling choices made by parents for their children respond quite strongly to changes in employment opportunities.1 The connection between growth and human capital is in fact a two-way street.

Even when educated workers leave for the developed world, they may contribute to the growth of their home country. Recently, economists have begun studying remittances, compensation sent back from recent immigrants to their families in less developed countries. While measurement is difficult, estimates of these remittances are approximately $100 billion per year. Remittances fund housing and education for families left behind, but they also can provide investment capital for small businesses. In 2007, it appeared that remittances from illegal immigrants in the United States to Mexico, which had been growing by 20 percent per year, were beginning to fall with tightening of enforcement of immigration rules. Remittances fell further in 2008–2009 with the recession.

In recent years, we have become increasingly aware of the role of entrepreneurship in economic development. Many of the iconic firms in the nineteenth century that contributed so strongly to the early industrial growth of the United States—Standard Oil, U.S. Steel, Carnegie Steel—were begun by entrepreneurs starting with little capital. In China, one of the top search engines is Baidu, a firm started in 2000 by two Chinese nationals, Eric Xu and Robin Li, and now traded on NASDAQ. Providing opportunities and incentives for creative risk takers seems to be an increasing part of what needs to be done to promote development.

Social Overhead Capital Anyone who has spent time in a developing nation knows how difficult it can be to carry on everyday life. Problems with water supplies, poor roads, frequent electrical power outages—in the few areas where electricity is available—and often ineffective mosquito and pest control make life and commerce difficult.

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ECONOMICS IN PRACTICE

Corruption

Many people have argued that one barrier to economic development in a number of countries is the level of corruption and inefficiency in the government. Measuring levels of corruption and inefficiency can be difficult. Some researchers have tried surveys and experiments. Ray Fisman\(^1\) had a more unusual way to measure the way in which political connections interfere with the workings of the market in Indonesia.

From 1967 to 1998, Indonesia was ruled by President Suharto. While Suharto ruled, his children and longtime allies were affiliated with a number of Indonesian companies. Fisman had the clever idea of looking at what happened to the stock market prices of those firms connected to the Suharto clan relative to unaffiliated firms when Suharto unexpectedly fell ill. Fisman found a large and significant reduction in the value of those affiliated firms on rumors of illness. What does this tell us? A firm’s stock price reflects investors’ views of what earnings the firm can expect to have. In the case of firms connected to Suharto, the decline in their stock prices tells us that a large part of the reason investors think that those firms are doing well is because of the family connection rather than the firm’s inherent efficiency. One reason corruption is bad for an economy is that it often leads to the wrong firms, the less efficient firms, producing the goods and services in the society.

The following chart shows the World Bank’s rating of corruption levels in a number of countries around the world. The countries are ranked from those with the strongest controls on corruption—Germany and France—to those with the lowest controls—Pakistan and Nigeria. Indonesia, as you can see, is near the bottom of the list.


Note: The governance indicators presented here aggregate the views on the quality of governance provided by a large number of enterprise, citizen, and expert survey respondents in industrial and developing countries. These data are gathered from a number of survey institutes, think tanks, nongovernmental organizations, and international organizations. The aggregate indicators do not reflect the official views of the World Bank, its executive directors, or the countries they represent.

In any economy, developing or otherwise, the government plays an investment role. In a developing economy, the government must create a basic infrastructure—roads, power generation, and irrigation systems. Such projects, referred to as social overhead capital, often cannot successfully be undertaken by the private sector. Many of these projects operate with economies of scale, which means they can be efficient only if they are very large, perhaps too large for any private company or group of companies to carry out. In other cases, the benefits from a development project, while extraordinarily valuable, cannot be easily bought and sold. The availability of clean air and potable water are two examples. Here government must play its role before the private sector can proceed. For example, some observers have recently argued that India’s growth prospects are being limited by its poor rail transport system. Goods from Singapore to India move easily over water in less than a day, but they can take weeks to move from port cities to supply factories in the interior. China, by contrast, spent the bulk of its stimulus money in the 2008–2009 period trying to build new transportation networks in part because the government understood how key this social overhead capital was to economic growth.

To build infrastructure requires public funding. Many less developed countries struggle with raising tax revenues to support these projects. In 2010, Greece struggled to repay its debt partly because of widespread tax evasion by its wealthiest citizens. In many less developed countries, corruption limits the public funds available for productive government investments, as the Economics in Practice on p. 718 suggests.

**Strategies for Economic Development**

Just as no single theory appears to explain lack of economic advancement, no one development strategy will likely succeed in all nations. How active a role should government play in directing economic development? What sectors should be emphasized? Should one focus on new business as a growth engine? These questions are being debated by economists and governments across the globe.

**Governments or Markets?** Soviet-style development was accomplished with detailed central planning, state ownership, and control of prices and output. Today in developing economies, the market plays a much stronger role. In most parts of the world, including nondemocratic countries like China, state ownership has declined and prices are mostly set in markets. International agencies like the **International Monetary Fund (IMF)**, whose primary goals are to stabilize international exchange rates and to lend money to countries with problems financing international transactions, and the **World Bank**, which lends money to countries for development projects, have pushed hard for market-oriented reforms.

Market-oriented reforms, however, have not eliminated the role of government. As indicated earlier, governments play a vital role in creating institutions that allow markets to work effectively—physical institutions like roads and schools, and business and legal institutions such as accounting systems and property rights. Many governments also use their taxing and expenditure policies to favor specific sectors over others as they try to grow. **Industrial policy**, in which governments actively pick industries to support as a base for economic development, is still carried on at some level in most developing nations. The greater central control of the economy in China was very evident during the recent recession in the speed with which China could direct its government expenditures as it sought to stimulate its economy.

**Agriculture or Industry?** Consider the data in Table 36.2. The richest countries listed—the United States, Japan, and Korea—generate much of their GDP in services, with little value contributed by agricultural production. The poorest countries, on the other hand, have substantial agricultural sectors, although as you can see, the service sector is also

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**International Monetary Fund (IMF)** An international agency whose primary goals are to stabilize international exchange rates and to lend money to countries that have problems financing their international transactions.

**World Bank** An international agency that lends money to individual countries for projects that promote economic development.

**Industrial policy** A policy in which governments actively pick industries to support as a base for economic development.
large in a number of these economies. A casual look at the data might well lead one to con-
clude that moving out of agriculture was the path to development. And, indeed, industrial-
ization was the path that Eastern Europe and other economies pursued in the post-World
War II period.

### Table 36.2 The Structure of Production in Selected Developed and Developing
Economies, 2008

<table>
<thead>
<tr>
<th>Country</th>
<th>Per-Capita Gross National Income (GNI)</th>
<th>Percentage of Gross Domestic Product</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Agriculture</td>
</tr>
<tr>
<td>Tanzania</td>
<td>$ 440</td>
<td>45</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>520</td>
<td>19</td>
</tr>
<tr>
<td>China</td>
<td>2,940</td>
<td>11</td>
</tr>
<tr>
<td>Thailand</td>
<td>3,670</td>
<td>12</td>
</tr>
<tr>
<td>Colombia</td>
<td>4,620</td>
<td>9</td>
</tr>
<tr>
<td>Brazil</td>
<td>7,300</td>
<td>7</td>
</tr>
<tr>
<td>Korea (Rep.)</td>
<td>21,530</td>
<td>3</td>
</tr>
<tr>
<td>Japan</td>
<td>38,130</td>
<td>1</td>
</tr>
<tr>
<td>United States</td>
<td>47,930</td>
<td>1</td>
</tr>
</tbody>
</table>


In many countries, however, industrialization has been unsuccessful. Some have argued
that a move out of agriculture may be a result of development, rather than a cause. Others
have suggested that industrialization worked for the Western economies but may not work as
well for economies with other distributions of human and physical capital. Indeed, in the
last several decades the agricultural sector has received more attention as a source of eco-
nomic development. Many agricultural projects with large productivity enhancement poten-
tial have relatively low capital requirements and thus may better match the capital-poor
developing world. Agricultural development also improves the lot of the rural population,
where more of the poor typically live. Finally, improving agriculture may slow the move of
the poor to cities, where infrastructure is inadequate for the growing population.

Experience over the last three decades suggests that some balance between industrialization
and agricultural reform leads to the best outcome—that is, it is important and effective to pay
attention to both industry and agriculture. The Chinese have referred to this dual approach to
development as “walking on two legs.”

**Exports or Import Substitution?** As developing nations expand their industrial
activities, they must decide what type of trade strategy to pursue. Development economists
discuss two alternatives: import substitution or export promotion.

Import substitution is a strategy used to develop local industries that can manufacture
goods to replace imports. If fertilizer is imported, import substitution calls for a domestic
fertilizer industry to produce replacements for fertilizer imports. This strategy
gained prominence throughout South America in the 1950s. At that time, most developing
nations exported agricultural and mineral products, goods that faced uncertain and often
unstable international markets. Under these conditions, the call for import substitution
policies was understandable. Special government actions, including tariff and quota
protection and subsidized imports of machinery, were set up to encourage new domestic
industries. Multinational corporations were also invited into many countries to begin
domestic operations.
Most economists believe that import substitution strategies have failed almost everywhere they have been tried. With domestic industries sheltered from international competition by high tariffs (often as high as 200 percent), major economic inefficiencies were created. For example, Peru has a population of approximately 29 million, only a tiny fraction of whom can afford to buy an automobile. Yet at one time, the country had five or six different automobile manufacturers, each of which produced only a few thousand cars per year. Because there are substantial economies of scale in automobile production, the cost per car was much higher than it needed to be, and valuable resources that could have been devoted to another, more productive, activity were squandered producing cars.

Furthermore, policies designed to promote import substitution often encouraged capital-intensive production methods, which limited the creation of jobs and hurt export activities. A country such as Peru could not export automobiles because it could produce them only at a cost far greater than their price on the world market. Worse still, import substitution policies encouraged the use of expensive domestic products, such as tractors and fertilizer, instead of lower-cost imports. These policies taxed the sectors that might have successfully competed in world markets.

As an alternative to import substitution, some nations have pursued strategies of export promotion. Export promotion is the policy of encouraging exports. As an industrial market economy, Japan was a striking example to the developing world of the economic success that exports can provide. Japan had an average annual per-capita real GDP growth rate of roughly 6 percent per year from 1960–1990. This achievement was, in part, based on industrial production oriented toward foreign consumers.

Several countries in the developing world have attempted to emulate Japan’s success. Starting around 1970, Hong Kong, Singapore, Korea, and Taiwan (the “four little dragons” between the two “big dragons,” China and Japan) began to pursue export promotion of manufactured goods. Today their growth rates have surpassed Japan’s. Other nations, including Brazil, Colombia, and Turkey, have also had some success at pursuing an outward-looking trade policy. China’s growth has been mostly export-driven as well.

Government support of export promotion has often taken the form of maintaining an exchange rate favorable enough to permit exports to compete with products manufactured in developed economies. For example, many people believe China has kept the value of the yuan artificially low. Because a “cheap” yuan means inexpensive Chinese goods in the United States, sales of these goods increased dramatically.

A big issue for countries growing or trying to grow by selling exports on world markets is free trade. African nations in particular have pushed for reductions in tariffs imposed on their agricultural goods by Europe and the United States, arguing that these tariffs substantially reduce Africa’s ability to compete in the world marketplace.

Microfinance In the mid 1970s, Muhammad Yunus, a young Bangladeshi economist created the Grameen Bank in Bangladesh. Yunus, who trained at Vanderbilt University and was a former professor at Middle Tennessee State University, used this bank as a vehicle to introduce microfinance to the developing world. In 2006, Yunus received a Nobel Peace Prize for his work. Microfinance is the practice of lending very small amounts of money, with no collateral, and accepting very small savings deposits. It is aimed at introducing entrepreneurs in the poorest parts of the developing world to the capital market. By 2002, more than 2,500 institutions were making these small loans, serving over 60 million people. Two-thirds of borrowers were living below the poverty line in their own countries, the poorest of the poor.

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2 An excellent discussion of microfinance is contained in Beatriz Armendariz de Aghion and Jonathan Morduch, *The Economics of Microfinance*, (MIT Press, 2005.)
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Yunus, while teaching economics in Bangladesh, began lending his own money to poor households with entrepreneurial ambitions. He found that with even very small amounts of money, villagers could start simple businesses: bamboo weaving or hair dressing. Traditional banks found these borrowers unprofitable: The amounts were too small, and it was too expensive to figure out which of the potential borrowers was a good risk. With a borrower having no collateral, information about his or her character was key but was hard for a big bank to discover. Local villagers, however, typically knew a great deal about one another’s characters. This insight formed the basis for Yunus’s microfinance enterprise. Within a village, people who are interested in borrowing money to start businesses are asked to join lending groups of five people. Loans are then made to two of the potential borrowers, later to a second two, and finally to the last. As long as everyone is repaying their loans, the next group receives theirs. But if the first borrowers fail to pay, all members of the group are denied subsequent loans. What does this do? It makes community pressure a substitute for collateral. Moreover, once the peer lending mechanism is understood, villagers have incentives to join only with other reliable borrowers. The mechanism of peer lending is a way to avoid the problems of imperfect information described in an earlier chapter.

The Grameen model grew rapidly. By 2002, Grameen was lending to two million members. Thirty countries and thirty U.S. states have microfinance lending copied from the Grameen model. Relative to traditional bank loans, microfinance loans are much smaller, repayment begins very quickly, and the vast majority of the loans are made to women (who, in many cases, have been underserved by mainstream banks). A growing set of evidence shows that providing opportunities for poor women has stronger spillovers in terms of improving the welfare of children than does comparable opportunities for men. While the field of microfinance has changed considerably since Yunus’s introduction and some people question how big a role it will ultimately play in spurring major development and economic growth, it has changed many people’s views about the possibilities of entrepreneurship for the poor of the world.

ECONOMICS IN PRACTICE

Cell Phones Increase Profits for Fishermen in India

Kerala is a poor state in a region of India. The fishing industry is a major part of the local economy, employing more than one million people and serving as the main source of protein for the population. Every day fishing boats go out; and when they return, the captain of the ship needs to decide where to take the fish to sell. There is much uncertainty in this decision: How much fish will they catch; what other boats will come to a particular location; how many buyers will there be at a location? Moreover, fuel costs are high and timing is difficult, so that once a boat comes ashore, it does not pay for the fishermen to search for a better marketplace. In a recent study of this area, Robert Jensen found on a Tuesday morning in November 1997, 11 fishermen in Badagara were dumping their load of fish because they faced no buyers at the dock. However, unbeknownst to them, 15 kilometers away, 27 buyers were leaving their marketplace empty-handed, with unsatisfied demand for fish.

Beginning in 1997 and continuing for the next several years, mobile phone service was introduced to this region of India. By 2001, the majority of the fishing fleet had mobile phones, which they use to call various vendors ashore to confirm where the buyers are. What was the result? Once the phones were introduced, waste, which had averaged 5 to 8 percent of the total catch, was virtually eliminated. Moreover, just as we would have predicted from the simple laws of supply and demand, the prices of fish across the various villages along the fishing market route were closer to each other than they were before. Jensen found that with less waste fishermen’s profits rose on average by 8 percent, while the average price of fish fell by 4 percent.

In fact, cell phones are improving the way markets in less developed countries work by providing price and quantity information so that both producers and consumers can make better economic decisions.

Two Examples of Development: China and India

China and India provide two interesting examples of rapidly developing economies. While low per-capita incomes still mean that both countries are typically labeled developing as opposed to developed countries, many expect that to change in the near future. In the 25-year period from 1978 to 2003, China grew, on average, 8 percent per year, a rate faster than any other country in the world. While India's surge has been more recent, in the last 5 years, it too has seen annual growth rates in the 8 to 9 percent range. Many commentators expect India and China to dominate the world economy in the twenty-first century.

How did these two rather different countries engineer their development? Consider institutions: India is a democratic country, has a history of the rule of law, and has an English-speaking heritage—all factors typically thought to provide a development advantage. China is still an authoritarian country politically, and property rights are still not well established—both characteristics that were once thought to hinder growth. Both China and India have embraced free market economics, with China taking the lead as India has worked to remove some of its historical regulatory apparatus.

What about social capital? Both India and China remain densely populated. While China is the most populous country in the world, India, with a smaller land mass, is the world's most densely populated country. Nevertheless, as is true in most developing nations, birth rates in both countries have fallen. Literacy rates and life expectancy in China are quite high, in part a legacy from an earlier period. India, on the other hand, has a literacy rate that is less than that of China's and a lower life expectancy. In terms of human capital, China appears to have the edge, at least for now.

What about the growth strategies used by the two countries? China has adopted a pragmatic, gradual approach to development, sharply in contrast to that adopted some years ago in Poland. China's approach has been called moshi guohe, or “Crossing the river by feeling for stepping stones.” In terms of sector, most of China's growth has been fueled by manufacturing. The focus on manufacturing is one reason that China's energy consumption and environmental issues have increased so rapidly in the last decade. In India, services have led growth, particularly in the software industry. In sum, it is clear that there is no single recipe for development.

Development Interventions

To this point we have used the terms growth and development interchangeably, assuming that as an economy grows in its level of income, it will develop to provide benefits to most of its population. Since the 1970s at least, however, economists and policy makers have questioned the relationship between growth and development. A 1974 World Bank study concluded that “More than a decade of rapid growth in underdeveloped countries has been of little or no benefit to perhaps a third of their population.” In the last 20 years, development economists have increasingly turned to much narrower, more microeconomically oriented programs to see if they can figure out which interventions do help the condition of the bottom of the income distribution in developing countries and how to replicate those successful programs.

Random and Natural Experiments: Some New Techniques in Economic Development

Suppose we were trying to decide whether it was worthwhile in terms of student achievement to hire another teacher to reduce the student-faculty ratio. One traditional way we might try to answer that question is to find two classrooms with different enrollments in otherwise similar school systems and look at the educational performance of the students. We see comparisons of this sort everyday in newspaper discussions of policies, and many
research projects take a variant of this approach. But the approach is subject to serious criticism. It is possible that differences in the two classrooms beyond the enrollment numbers also matter to performance—differences we have failed to correct in the comparisons we make. Crowded classrooms may be in poorer areas (indeed, this may account for the crowding); they may have less effective teachers; they may lack other resources. In the social sciences, it is very difficult to ensure that we have comparisons that differ only in the one element in which we are interested. The fact that our interventions involve people makes even harder. In the case of the classrooms with small enrollment, it may well be that the most attentive parents have pushed to have their children in these classrooms, believing them to be better. Perhaps the best teachers apply to lead these classrooms, and their higher quality makes it more likely that they get their first choice of classrooms. If either of these things happens, the two classrooms will differ in systematic ways that bias the results in favor of finding better performance in the smaller classrooms. More attentive parents may provide home support that results in better test outcomes for their children even if the classrooms are crowded. Better teachers improve performance no matter how crowded the classrooms are. Problems of this sort, sometimes called selection bias, plague social science research.

In recent years, a group of development economists began using a technique borrowed from the natural sciences, the \textit{random experiment}, to try to get around the selection problem in evaluating interventions. Instead of looking at results from classrooms that have made different choices about class size or textbooks, for example, the experimenters randomly assign otherwise identical-looking classes to follow an intervention or not. Students and teachers are not allowed to shift around. By comparing the outcomes of large numbers of randomly selected subjects with control groups, social scientists hope to identify effects of interventions in much the same way natural scientists evaluate the efficacy of various drugs.

The leading development group engaged in random experiments in the education and health areas is the Poverty Research Lab at MIT, run by Esther Duflo and Abhijit Banerjee. By working with a range of NGOs and government agencies in Africa, Latin America, and Asia, these economists have looked at a wide range of possible investments to help improve outcomes for the poorest of the poor.

Of course, not all policies can be evaluated this way. Experimenters do not always have the luxury of random assignment. An alternative technique is to rely on what have been called \textit{natural experiments} to mimic the controlled experiment. Suppose I am interested in the effect of an increase in wealth on the likelihood that a poor family will enroll its daughters in school. Comparing school behavior of rich and poor families is obviously problematic because they are likely to differ in too many ways to control adequately. Nor does it seem feasible to substantially increase the wealth of a large number of randomly selected parents. But in an agrarian community we may observe random, annual weather occurrences that naturally lead to occasional years of plenty, and by observing behavior in those years versus other years, we may learn a good deal. The weather in this case has created a natural experiment.

Empirical development economics thus has added experimental methods to its tool kit as a way to answer some of the very difficult and important questions about what does and does not work to improve the lot of the poor in developing nations. We turn now to look at some of the recent work in the fields of education and health, focusing on this experimental work, to provide some sense of the exciting work going on in this field.

\textbf{Education Ideas}

As we suggested earlier, human capital is an important ingredient in the economic growth of a nation. As economies grow, returns to education also typically grow. As we move from traditional agrarian economies to more diversified and complex economies, the advantages to an individual from education rises. So if we want a nation’s poor to benefit from growth,
improving their educational outcomes is key. This leads us to one of the central preoccupations of development economists in the last decade or so: Of the many investments one could make in education, which have the highest payoffs? Is it better to invest in more books or more teachers? How much does the quality of teachers matter? Are investments most important in the first years of education or later? In a world with limited resources in which educational outcomes are very important, getting the right answers to these questions is vital.

For most middle-class American students, it may come as a surprise that in the developing world, teacher absenteeism is a serious problem. A recent study led by researchers from the World Bank found, for example, that on an average day, 27 percent of Ugandan and 25 percent of Indian teachers are not at work. Across six poor countries, teacher absences averaged 19 percent. The Poverty Research Lab has conducted a number of experiments in a range of developing countries to see how one might reduce these absences. The most successful intervention was introduced in Rajasthan, India, by an NGO called Seva Mandir. Each day when he or she arrived, the teachers in half of Seva Mandir’s 160-single teacher schools were asked to have their picture taken with the children. Cameras were date-stamped. This evidence of attendance fed into the compensation of the teacher. Teacher absentee rates were cut in half relative to the seemingly identical classrooms in which no cameras were introduced.

Student absenteeism is also a problem throughout the developing world, reducing educational outcomes even when schools are well staffed with qualified teachers. Several countries, including Mexico, have introduced cash payments to parents for sending their children to school regularly. Since the Mexican government introduced these payments over time, in ways not likely to be related to educational outcomes, researchers could compare student absenteeism across seemingly identical areas with and without the cash incentives as a form of natural experiment. There is some evidence that cash payments do increase school attendance. Natural experiments have also been used to look at the effect of industrialization that improves educational returns as a way to induce better school attendance; the results have been positive.

Work using experiments, both natural and random, is still at an early stage in development economics. While many reform ideas have proven helpful in improving educational outcomes in different developing countries, it has proven hard up to now to find simple answers that work across the globe. Nevertheless, these new techniques appear to offer considerable promise as a way of tackling issues of improving education for the poor of the developing world.

**Health Improvements**

Poor health is a second major contributor to individual poverty. In the developing world, estimates are that one-quarter of the population is infected with intestinal worms that sap the energy of children and adults alike. Malaria remains a major challenge in Africa, as does HIV/AIDS.

In the case of many interventions to improve health, human behavior plays an important role, and here is where development economics has focused. For many diseases, we have workable vaccines. But we need to figure out how to encourage people to walk to health clinics or schools to get those vaccines. We want to know if charging for a vaccine will substantially reduce uptake. For many waterborne diseases, treatment of drinking water with bleach is effective, but the taste is bad and bleach is not free. How do we induce usage? Treated bed nets can reduce malaria, but only if they are properly used. In each of these cases, there are benefits to the individual from seeking treatment or preventive care, but also costs. In the last several years, a number of development economists have explored the way in which individuals in developing economies have responded to policies that try to change these costs and benefits.

Intestinal worms, quite common in areas of Africa with inadequate sanitation, are treatable with periodic drugs at a relatively low cost. Michael Kremer and Ted Miguel, working with the World Bank, used random experiments in Kenya to examine the effect of health education
and user fees on families’ take-up of treatment of their children. Kremer and Miguel found a 
number of interesting results, results very much in keeping with economic principles. First, a pro-
gram of charging user fees—even relatively low ones—dramatically reduced treatment rates. The 
World Bank’s attempts to make programs more financially self-sustaining, if used in this area, were 
likely to have large, averse public health effects. Elasticities were well above one. Kremer and 
Miguel also found that as the proportion of vaccinated people in a village grew, and thus the risk of 
contagion fell, fewer people wanted treatment, indicating some sensitivity to costs and benefit cal-
culations by the villagers. Disappointingly, health education did not seem to make much difference.

As with the area of education, much remains for development economists to understand 
in the area of health and human behavior. Development economics continues to be one of the 
most exciting areas in economics.

Population Issues

The populations of the developing nations are estimated to be growing at about 1.7 percent 
per year. If the Third World’s population growth remained at this level, within 41 years its 
population would double from its 1990 level of 4.1 billion to over 8 billion by the year 2031. 
For poor nations, rapid population growth can strain infrastructure and may impede devel-
opment. For this reason, population control has at times been part of the development strat-

ey of a number of nations.

Figure 36.1 provides the long historical record of population growth in the world. More 
than 200 years ago, the Reverend Thomas Malthus, England’s first professor of political 
economy, expressed his fears about this record of population growth. Malthus believed that 
populations inexorably grew geometrically at a constant growth rate, while the diminishing 
productivity of land caused food supplies to grow more slowly. Looking at the two phenom-
ena together led Malthus to predict the increasing impoverishment of the world’s people 
unless population could be slowed.

Malthus’s fears for Europe and America proved unfounded. Technological changes revolu-
tionized agriculture so that food supplies grew despite the scarcity of land. At the same

![FIGURE 36.1 The Growth of World Population, Projected to A.D. 2020](image)

For thousands of years, population grew slowly. From A.D. 1 until the mid 1600s, population grew at 
about .04 percent per year. Since the Industrial Revolution, population growth has occurred at an 
unprecedented rate.
time, population growth fell dramatically in Europe and America. Nor did Malthus fully see the causal connection between technical change, economic growth, and population. As early as the mid 1960s, economist T. W. Schultz argued that technical progress increased the returns to education by making it harder for children to simply move into the jobs of their parents. Faced with this recognition, more parents in the developing world reduced their family sizes to better consolidate resources for education. Economists have referred to this reduction in family size and increase in child education levels as trading quantity of children for quality. In some countries, market forces pushing populations toward reduced family size have been helped along by government policies aimed at reducing populations.

Of course, there are parts of the developing world in which population growth continues at high levels. Uganda, with a GDP of $300 per capita, had a population growth rate in 2008 of 3.6 percent, one of the highest in the world. As an agrarian economy with high infant mortality rates, Uganda, as well as a number of other countries, still values large families. In agrarian societies, children are sources of farm labor and they may make significant contributions to household income. In societies without public old-age-support or social security programs, children may also provide a source of income for parents who are too old to support themselves. With the high value of children enhanced by high rates of infant mortality, it is no wonder that families try to have many children to ensure that a sufficient number will survive into adulthood.

Economic theories of population growth suggest that fertility decisions made by poor families should not be viewed as uninformed and uncontrolled. An individual family may find that having many children is a rational strategy for economic survival given the conditions in which it finds itself. Only when the relationship between the costs and benefits of having children changes, in places like Uganda, will fertility rates decline. This does not mean, however, that having many children is a net benefit to society as a whole. When a family decides to have a large number of children, it imposes costs on the rest of society; the children must be educated, their health provided for, and so on. In other words, what makes sense for an individual household may create negative effects for the nation as a whole.

The Transition to a Market Economy

In the last several decades, a number of countries have made the transition from a planned economy to a market economy. Russia and the formerly Communist countries of Eastern Europe led the way in this transition beginning in the late-1980s. For a number of these countries, the early transition period was difficult, and there has been considerable debate about the optimal speed of transitions and ways to manage the social upheaval that often comes with economic reform.

For example, between 1992 and 2002, while per-capita income grew by 51 percent in Poland, it shrank by 63 percent in the Ukraine. Countries of the former USSR seem to have had a particularly difficult transition to market economies. Economists have attributed differences in ease of transition to reform strategies (slow versus fast), resource endowments of the country, and differences in institutions.

In more recent years, China and Vietnam have joined the collection of transition economies, coming to rely less on central planning for economic decisions and more on the market. India too is sometimes thought to be a transition economy, as it has in the last decade dismantled much of its government ownership and elaborate rules governing market transactions.

Six Basic Requirements for Successful Transition

Economists generally agree on six basic requirements for a successful transition to a market-based system: (1) macroeconomic stabilization, (2) deregulation of prices and liberalization of trade, (3) privatization of state-owned enterprises and development of new private industry,
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(4) establishment of market-supporting institutions such as property and contract laws and accounting systems, (5) a social safety net to deal with unemployment and poverty, and (6) external assistance. We now discuss each component.

Macroeconomic Stabilization  Many countries in transition have had a problem with inflation, but nowhere has it been worse than in Russia. As economic conditions worsened, the government found itself with serious budget problems. As revenue flows slowed and expenditure commitments increased, large budget deficits resulted. At the same time, each of the new republics established its own central bank. Each central bank began issuing “ruble credits” to keep important enterprises afloat and to pay the government’s bills. The issuance of these credits, which were generally accepted as a means of payment throughout the country, led to a dramatic expansion of the money supply.

Almost from the beginning, the expanded money supply meant too much money was chasing too few goods. This was made worse by government-controlled prices set substantially below market-clearing levels. The combination of monetary expansion and price control was deadly. Government-run shops that sold goods at controlled prices were empty. People waited in line for days and often became violent when their efforts to buy goods at low official prices were thwarted. At the same time, suppliers found that they could charge much higher prices for their products on the black market—which grew bigger by the day, further exacerbating the shortage of goods at government shops. Over time, the ruble became worth less and less as black market prices continued to rise more rapidly. Russia found itself with near hyperinflation in 1992. To achieve a properly functioning market system, prices must be stabilized. To do so, the government must find a way to move toward a balanced budget and to bring the supply of money under control. China and India, in contrast to Russia and Eastern European states, initially suffered only modest inflation as they decontrolled their prices, though more recently inflation appears to be increasing in China.

Deregulation of Prices and Liberalization of Trade  To move successfully from central planning to a market system, individual prices must be deregulated. A system of freely moving prices forms the backbone of a market system. When people want more of a good than is currently being produced, its price will rise. This higher price increases producers’ profits and provides an incentive for existing firms to expand production and for new firms to enter the industry. Conversely, if an industry is producing a good for which there is no market or a good that people no longer want in the same quantity, the result will be excess supply and the price of that good will fall. This outcome reduces profits or creates losses, providing an incentive for some existing firms to cut back on production and for others to go out of business. In short, an unregulated price mechanism ensures an efficient allocation of resources across industries. Until prices are deregulated, this mechanism cannot function. In practice, transition economies have moved at varying speeds in decontrolling prices. Vietnam, for example, decontrolled prices very quickly in moving to a market economy, as did Poland. China, on the other hand, took a slower path in freeing prices from state control.

Trade barriers must also be removed. Reform-minded countries must be able to import capital, technology, and ideas. In addition, it makes no sense to continue to subsidize industries that cannot be competitive on world markets. If it is cheaper to buy steel from an efficient West German steel mill than to produce it in a subsidized antiquated Russian mill, the Russian mill should be modernized or shut down. Ultimately, as the theory of comparative advantage suggests, liberalized trade will push each country to produce the products it produces best.
Deregulating prices and eliminating subsidies can bring serious political problems. Many products in Russia and the rest of the socialist world were priced below market-clearing levels for equity reasons. Housing, food, and clothing were considered by many to be entitlements. Making them more expensive, at least relative to their prices in previous times, is not likely to be popular. In 2008, rising rice prices in Southeast Asia caused considerable unrest in Vietnam, Thailand, and Cambodia. In addition, forcing inefficient firms to operate without subsidies will lead many of them to go out of business, and jobs will be lost. So while price deregulation and trade liberalization are necessary, they are very difficult politically.

Privatization One problem with a system of central ownership is a lack of accountability. Under a system of private ownership, owners reap the rewards of their successes and suffer the consequences of their failures. Private ownership provides a strong incentive for efficient operation, innovation, and hard work that is lacking when ownership is centralized and profits are distributed to the people.

The classic story to illustrate this point is called the tragedy of commons, which is the idea that collective ownership may not provide the proper private incentives for efficiency because individuals do not bear the full costs of their own decisions but do enjoy the full benefits. Suppose an agricultural community has 10,000 acres of grazing land. If the land was held in common so that all farmers had unlimited rights to graze their animals, each farmer would have an incentive to overgraze. He or she would reap the full benefits from grazing additional calves while the costs of grazing the calves would be borne collectively. The system provides no incentive to manage the land efficiently. Similarly, if the efficiency and benefits of your hard work and managerial skills accrue to others or to the state, what incentive do you have to work hard or to be efficient?

One solution to the tragedy of commons attempted in eighteenth-century Britain was to divide up the land into private holdings. Today, many economists argue, the solution to the incentive problem encountered in state-owned enterprises is to privatize them and let the owners compete.

In addition to increasing accountability, privatization means creating a climate in which new enterprises can flourish. If there is market demand for a product not currently being produced, individual entrepreneurs should be free to set up a business and make a profit. During the last months of the Soviet Union’s existence, private enterprises such as taxi services, car repair services, restaurants, and even hotels began to spring up all over the country.

Like deregulation of prices, privatization is difficult politically. Privatization means that many protected enterprises will go out of business because they cannot compete at world prices, resulting in a loss of jobs, at least temporarily.

Market-Supporting Institutions Between 1991 and 1997, U.S. firms raced to Eastern Europe in search of markets and investment opportunities and immediately became aware of a major obstacle. The institutions that make the market function relatively smoothly in the United States did not exist in Eastern Europe. For example, the capital market, which channels private saving into productive capital investment in developed capitalist economies, is made up of hundreds of different institutions. The banking system, venture capital funds, the stock market, the bond market, commodity exchanges, brokerage houses, investment banks, and so on, have developed in the United States over hundreds of years, and they could not be replicated overnight in the formerly Communist world.

Similar problems exist in the Chinese economy. While the Chinese equity market has grown rapidly in the last decade, that growth has been accompanied by problems with weak governance and lack of transparency. These issues discourage investments by western firms.
Many market-supporting institutions are so basic that Americans take them for granted. The institution of private property, for example, is a set of rights that must be protected by laws that the government must be willing to enforce. Suppose the French hotel chain Novotel decides to build a new hotel in Moscow or Beijing. Novotel must first acquire land. Then it will construct a building based on the expectation of renting rooms to customers. These investments are made with the expectation that the owner has a right to use them and a right to the profits that they produce. For such investments to be undertaken, these rights must be guaranteed by a set of property laws. This is equally true for large business firms and for local entrepreneurs who want to start their own enterprises. China’s ambiguous property rights laws may also be problematic. While farmers can own their own homes, for example, all rural land is collectively owned by villages. Farmers have the right to manage farmland, but not own it. As a result, transfer of land is difficult.

Similarly, the law must provide for the enforcement of contracts. In the United States, a huge body of law determines what happens if you break a formal promise made in good faith. Businesses exist on promises to produce and promises to pay. Without recourse to the law when a contract is breached, contracts will not be entered into, goods will not be manufactured, and services will not be provided.

Protection of intellectual property rights is also an important feature of developed market economies. When an artist puts out a record, the artist and his or her studio are entitled to reap revenues from it. When Apple developed the iPod, it too earned the right to collect revenue for its patent ownership. Many less developed countries lack laws and enforcement mechanisms to protect intellectual property of foreign investments and their own current and future investors. The lack of protection discourages trade and home-grown invention. For example, in late 2007, China, in recognition of some of these issues, began drafting a new set of laws for intellectual property protection.

Another seemingly simple matter that turns out to be quite complex is the establishment of a set of accounting principles. In the United States, the rules of the accounting game are embodied in a set of generally accepted accounting principles (GAAP) that carry the force of law. Companies are required to keep track of their receipts, expenditures, and liabilities so that their performance can be observed and evaluated by shareholders, taxing authorities, and others who have an interest in the company. If you have taken a course in accounting, you know how detailed these rules have become. Imagine trying to do business in a country operating under hundreds of different sets of rules. That is what happened in Russia during its transition.

Another institution is insurance. Whenever a venture undertakes a high-risk activity, it buys insurance to protect itself. Several years ago Amnesty International (a nonprofit organization that works to protect civil liberties around the world) sponsored a worldwide concert tour with a number of well-known rock bands and performers. The most difficult part of organizing the tour was obtaining insurance for the artists and their equipment when they played in the then-Communist countries of Eastern Europe.

**Social Safety Net**

In a centrally planned socialist economy, the labor market does not function freely. Everyone who wants a job is guaranteed one somewhere. The number of jobs is determined by a central plan to match the number of workers. There is essentially no unemployment. This, it has been argued, is one of the great advantages of a planned system. In addition, a central planning system provides basic housing, food, and clothing at very affordable levels for all. With no unemployment and necessities available at very low prices, there is no need for unemployment insurance, welfare, or other social programs.

Transition to a free labor market and liberalization of prices means that some workers will end up unemployed and that everyone will pay higher prices for necessities. Indeed, during the early phases of the transition process, unemployment will be high. Inefficient state-owned enterprises will go out of business; some sectors will contract while others expand. As more and more people experience unemployment, popular support for reform is likely to drop unless some sort of social safety net is erected to ease the transition. This social
safety net might include unemployment insurance, aid for the poor, and food and housing assistance. The experiences of the developed world have shown that such programs are expensive.

External Assistance Very few believe that the transition to a market system can be achieved without outside support and some outside financing. Knowledge of and experience with capitalist institutions that exist in the United States, Western Europe, and Japan are of vital interest to the Eastern European nations. The basic skills of accounting, management, and enterprise development can be taught to developing nations; many say it is in everyone’s best interest to do so.

There is little agreement about the extent of financial support that should be given, however. In the case of Russia, the United States pushed for a worldwide effort to provide billions of dollars in aid, to stabilize its macroeconomy, and to buy desperately needed goods from abroad. For China, no such aid was thought to be necessary.

Shock Therapy or Gradualism? Although economists generally agreed on what the former socialist economies needed to do, they debated the sequence and timing of specific reforms.

The popular press described the debate as one between those who believe in “shock therapy” (sometimes called the Big Bang approach) and those who prefer a more gradual approach. Advocates of shock therapy believe that the economies in transition should proceed immediately on all fronts. They should stop printing money, deregulate prices and liberalize trade, privatize, develop market institutions, build a social safety net, and acquire external aid—all as quickly as possible. The pain will be severe, the argument goes, but in the end, it will be forgotten as the transition raises living standards. Advocates of a gradualist approach believe the best course is to build up market institutions first, gradually decontrol prices, and privatize only the most efficient government enterprises first.

Those who favor moving quickly point to the apparent success of Poland, which moved rapidly through the first phases of reform. Russia’s experience during the first years of its transition demonstrated that, at least in that country, change must, to some extent, be gradual. In theory, stabilization and price liberalization can be achieved instantaneously. To enjoy the benefits of liberalization, a good deal of privatization must have taken place—and that takes time. One analyst has said that privatization means “selling assets with no value to people with no money.” Some estimates suggest that half of Russian state-owned enterprises were incapable of making a profit at world prices. Simply cutting them loose would create chaos. In a sense, Russia had no choice but to move slowly.

**S U M M A R Y**

1. The economic problems facing the developing countries are often quite different from those confronting industrialized nations. The policy options available to governments may also differ. Nonetheless, the tools of economic analysis are as useful in understanding the economies of less developed countries as in understanding the U.S. economy.

2. The central reality of life in the developing countries is poverty. Although there is considerable diversity across the developing nations, most of the people in most developing countries are extremely poor by U.S. standards.

3. Almost all developing nations have a scarcity of physical capital relative to other resources, especially labor. The vicious-circle-of-poverty hypothesis says that poor countries cannot escape from poverty because they cannot afford to postpone consumption—that is, to save—to make investments. In its crude form, the hypothesis is wrong inasmuch as some prosperous countries were at one time poorer than many developing countries are today. However, it is often difficult to mobilize saving efficiently in many developing nations.

4. Human capital—the stock of education and skills embodied in the workforce—plays a vital role in economic development.
5. Developing countries are often burdened by inadequate social overhead capital, ranging from poor public health and sanitation facilities to inadequate roads, telephones, and court systems. Such social overhead capital is often expensive to provide, and many governments are not in a position to undertake many useful projects because they are too costly.

6. Inefficient and corrupt bureaucracies also play a role in retarding economic development in places.

7. Among the many questions governments in developing nations must answer as they seek a road to growth and development is how much to rely on free working markets versus central planning. In recent decades, the pendulum has shifted toward market-based strategies, with governments playing more of a role in creating institutions supportive of markets.

8. Because developed economies are characterized by a large share of output and employment in the industrial sector, many developing countries seem to believe that development and industrialization are synonymous. In many cases, developing countries have pursued industry at the expense of agriculture, with mixed results. Recent evidence suggests that some balance between industry and agriculture leads to the best outcome.

9. Import-substitution policies, a trade strategy that favors developing local industries that can manufacture goods to replace imports, were once very common in developing nations. In general, such policies have not succeeded as well as those promoting open, export-oriented economies.

10. The failure of many central planning efforts has brought increasing calls for less government intervention and more market orientation in developing economies.

11. Microfinance—lending small amounts to poor borrowers using peer lending groups—has become an important new tool in encouraging entrepreneurship in developing countries.

12. China and India have followed quite different paths in recent development.

DEVELOPMENT INTERVENTIONS p. 723

13. Development economists have begun to use randomized experiments as a way to test the usefulness of various interventions.

In these experiments, modeled after the natural sciences, individuals or even villages are randomly assigned to receive various interventions and the outcomes they experience are compared with those of control groups. In the areas of education and health, random experiments have been most prevalent.

14. Development economists also rely on natural experiments to learn about the efficacy of various interventions. In a natural experiment, we compare areas with differing conditions that emerge as a consequence of an unrelated outside force.

15. Many of the newer economic studies focus on understanding how to motivate individuals to take actions that support policy interventions: to use health equipment properly, to attend schools, to receive vaccinations.

16. Rapid population growth is characteristic of many developing countries. Large families can be economically rational because parents need support in their old age or because children offer an important source of labor. However, having many children does not mean a net benefit to society as a whole. Rapid population growth can put a strain on already overburdened public services such as education and health.

THE TRANSITION TO A MARKET ECONOMY p. 727

17. Economists generally agree on six requirements for a successful transition from socialism to a market-based system: (1) macroeconomic stabilization, (2) deregulation of prices and liberalization of trade, (3) privatization, (4) establishment of market-supporting institutions, (5) a social safety net, and (6) external assistance.

18. Much debate exists about the sequence and timing of specific reforms. The idea of shock therapy is to proceed immediately on all six fronts, including rapid deregulation of prices and privatization. The gradualist approach is to build up market institutions first, gradually decontrol prices, and privatize only the most efficient government enterprises first.
CHAPTER 36  Economic Growth in Developing and Transitional Economies

PROBLEMS

All problems are available on www.myeconlab.com

1. One of the biggest problem facing developing countries across the globe in 2009 was disease. More than 1 million people died of malaria and over 2 million deaths were due to HIV/AIDS, with most of these deaths occurring in Africa. Describe the effects of these diseases on the economies of these countries. Make sure you discuss the sources of economic growth and the use of scarce resources.

2. For a developing country to grow, it needs capital. The major source of capital in most countries is domestic saving, but the goal of stimulating domestic saving usually is in conflict with government policies aimed at reducing inequality in the distribution of income. Comment on this trade-off between equity and growth. How would you go about resolving the issue if you were the president of a small, poor country?

3. The GDP of any country can be divided into two kinds of goods: capital goods and consumption goods. The proportion of national output devoted to capital goods determines, to some extent, the nation’s growth rate.
   a. Explain how capital accumulation leads to economic growth.
   b. Briefly describe how a market economy determines how much investment will be undertaken each period.
   c. Consumption versus investment is a more painful conflict to resolve for developing countries. Comment on that statement.
   d. If you were the benevolent dictator of a developing country, what plans would you implement to increase per capita GDP?

4. The World Bank and the International Monetary Fund were scheduled to formally cancel the debts of 18 very poor countries in 2006, and the African Development Bank was committed to taking the same action during its 2006 annual meeting. Go online and find out whether these debts were indeed canceled. How much debt was forgiven during that year in each of the countries involved? What are the expected benefits to those countries?

5. Poor countries are trapped in a vicious circle of poverty. For output to grow, they must accumulate capital. To accumulate capital, they must save (consume less than they produce). Because they are poor, they have little or no extra output available for savings—it must all go to feed and clothe the present generation. Thus they are doomed to stay poor forever. Comment on each step in that argument.

6. Famines are acts of God resulting from bad weather or other natural disasters. There is nothing we can do about them except to send food relief after they occur. Explain why that position is inaccurate. Concentrate on agricultural pricing policies and distributional issues.

7. In China, rural property is owned collectively by the village while being managed under long-term contracts by individual farmers. Why might this be a problem in terms of optimal land management, use, and allocation?

8. How does peer lending used in microfinance help to solve the problem of adverse selection?

9. [Related to the Economics in Practice on p. 722] Find another example of the use of cell phones as a way to improve market functioning in a developing economy.

10. [Related to the Economics in Practice on p. 718] Corruption in a government is often accompanied by inefficiency in the economy. Why should this be true?

11. The distribution of income in a capitalist economy is likely to be more unequal than it is in a socialist economy. Why is this so? Is there a tension between the goal of limiting inequality and the goal of motivating risk taking and hard work? Explain your answer in detail.

12. The following quote is from the Encyclopedia of the Developing World: “[Some scholars] suggest that poor people are not poor because they have large families, but rather they have large families because they are poor.” Explain the logic behind this quote.

13. Explain how each of the following can limit the economic growth of developing nations.
   a. Insufficient capital formation
   b. A shortage of human resources
   c. A lack of social overhead capital

14. Of the roughly 7 billion people in the world, more than 75 percent live in developing countries, and one issue of economic concern in many of these countries is that of population growth. In the summary report of the Population Reference Bureau’s 2008 World Population Data Sheet, PRB president Bill Butz made the following comment: “Nearly all of world population growth is now concentrated in the world’s poorer countries. Even the small amount of overall growth in the wealthier nations will largely result from immigration.” Explain how rapid population growth can limit a nation’s productivity. Are there any ways in which population growth can have a positive economic effect? Explain.

15. You have been hired as an economic consultant for the nation of Ishtar. Ishtar is a developing nation that has recently emerged from a 10-year civil war; as a result, it has experienced appreciable political instability. Ishtar has a serious lack of capital formation, and capital flight has been a problem since before the civil war began. As an economic consultant, what policy recommendations would you make for the economic development of Ishtar?
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The total income (aggregate income) \( Y \) is a combined term used to remind you of the exact equality between aggregate output and aggregate income. p. 459

The total supply of all goods and services in an economy. p. 560

A graph that shows the relationship between the aggregate quantity of output supplied by all firms in an economy and the overall price level. p. 560

A term coined by Keynes to describe investors’ feelings. p. 624

The rise in value of one currency relative to another. p. 698

One of the parties to a transaction has information relevant to the transaction that the other party does not have. p. 357

Revenue and expenditure items in the federal budget that automatically change with the economy in such a way as to stabilize GDP. p. 492 p. 612

Revenue and expenditure items in the federal budget that automatically change with the state of the economy in such a way as to stabilize GDP. p. 492 p. 611

Total fixed cost divided by the number of units of output; a per-unit measure of fixed costs. p. 169

The average amount produced by each unit of a variable factor of production. p. 154

Total amount of tax paid divided by total income. p. 391

Total cost divided by the number of units of output. p. 175

Total variable cost divided by the number of units of output. p. 174

The record of a country’s transactions in goods, services, and assets with the rest of the world; also the record of a country’s sources (supply) and uses (demand) of foreign exchange. p. 688

A country’s exports of goods and services minus its imports of goods and services. p. 689

In the United States, the sum of the following (measured in a given period): the change in private U.S. assets abroad, the change in foreign private assets in the United States, the change in U.S. government assets abroad, and the change in foreign government assets in the United States. p. 690

Net exports of goods plus net exports of services plus net investment income plus net transfer payments. p. 689

The ratio of change in the equilibrium level of output to a change in government spending where the change in government spending is balanced by a change in taxes so as not to create any deficit. The balanced-budget multiplier is equal to 1: The change in \( Y \) resulting from the change in \( G \) and the equal change in \( T \) are exactly the same size as the initial change in \( G \) or \( T \). p. 486

Factors that prevent new firms from entering and competing in imperfectly competitive industries. p. 278

The direct exchange of goods and services for other goods and services. p. 502

The year chosen for the weights in a fixed-weight procedure. p. 433

A branch of
capital stock  For a single firm, the current market value of the firm's plant, equipment, inventories, and intangible assets.  p. 234

cartel  A group of firms that gets together and makes joint price and output decisions to maximize joint profits.  p. 297

circular flow  A diagram showing the income received and payments made by each sector of the economy.  p. 413

Clayton Act  Passed by Congress in 1914 to strengthen the Sherman Act and clarify the rule of reason, the act outlawed specific monopolistic behaviors such as tying contracts, price discrimination, and unlimited mergers.  p. 286

Coase theorem  Under certain conditions, when externalities are present, private parties can arrive at the efficient solution without government involvement.  p. 334

command economy  An economy in which a central government either directly or indirectly sets output targets, incomes, and prices.  p. 40

commitment device  Actions that individuals take in one period to try to control their behavior in a future period.  p. 317

commodity monies  Items used as money that also have intrinsic value in some other use.  p. 502

comparative advantage  A producer has a comparative advantage over another in the production of a good or service if he or she can produce that product at a lower opportunity cost.  p. 29  p. 665

compensating differentials  Differences in wages that result from differences in working conditions. Risky jobs usually pay higher wages; highly desirable jobs usually pay lower wages.  p. 368

compensation of employees  Includes wages, salaries, and various supplements—employer contributions to social insurance and pension funds, for example—paid to households by firms and by the government.  p. 429

complements, complementary goods  Goods that "go together"; a decrease in the price of one results in an increase in demand for the other and vice versa.  p. 55

concentration ratio  The share of industry output in sales or employment accounted for by the top firms.  p. 295

constant returns to scale  An increase in a firm's scale of production has no effect on costs per unit produced.  p. 195

constant-cost industry  An industry that shows no economies or diseconomies of scale as the industry grows. Such industries have flat, or horizontal, long-run supply curves.  p. 212  p. 213

constrained supply of labor  The amount a household actually works in a given period at the current wage rate.  p. 620

consumer goods  Goods produced for present consumption.  p. 32
consumer price index (CPI) A price index computed each month by the Bureau of Labor Statistics using a bundle that is meant to represent the “market basket” purchased monthly by the typical urban consumer. p. 448

cost-push, or cost-of-living adjustments (COLAs) cost shock, or corporate profits The income of Promissory notes corporate bonds The tariffs, subsidies, and Corn Laws A contractionary monetary policy

demand curve A graph illustrating how much of a given product a household would be willing to buy at different prices. p. 51
demand-schedule A table showing how much of a given product a household would be willing to buy at different prices. p. 51
demand-determined price The price of a good that is in fixed supply; it is determined exclusively by what households and firms are willing to pay for the good. p. 224
demand-pull inflation Inflation that is initiated by an increase in aggregate demand. p. 567
depreciation The amount by which an asset’s value falls in a given period. p. 236

depreciation of a currency The fall in value of one currency relative to another. p. 224

depression A prolonged and deep recession. p. 410
derived demand The demand for resources (inputs) that is dependent on the demand for the outputs those resources can be used to produce. p. 215
descriptive economics The compilation of data that describe phenomena and facts. p. 10
desired, or optimal, level of inventories The level of inventory at which the extra cost (in lost sales) from lowering inventories by a small amount is just equal to the extra gain (in interest revenue and decreased storage costs). p. 626
diamond/water paradox A paradox stating that (1) the things with the greatest value in use frequently have little or no value in exchange and (2) the things with the greatest value in exchange frequently have little or no value in use. p. 129
diminishing marginal utility The more of any one good consumed in a given period, the less incremental satisfaction is generated by consuming a marginal or incremental unit of the same good. p. 354
discount rate The interest rate that banks pay to the Fed to borrow from it. p. 516
discouraged-worker effect The decline in the measured unemployment rate that results when people who want to work but cannot find jobs grow discouraged and stop looking, thus dropping out of the ranks of the unemployed and the labor force. p. 444

discretionary fiscal policy Changes in taxes or spending that are the result of deliberate changes in government policy. p. 478
disembodied technical change Technical change that results in a change in the production process. p. 642
disposable personal income or after-tax income Personal income minus personal income taxes. The amount that households have to spend or save. p. 431

disposable, or after-tax, income (Yd) Total income minus net taxes: Y – T. p. 478

dividends The portion of a firm’s profits that the firm pays out each period to its shareholders. p. 415

Doha Development Agenda An initiative of the World Trade Organization focused on issues of trade and development. p. 674

dominant strategy In game theory, a strategy that is best no matter what the opposition does. p. 301

Dow Jones Industrial Average An index based on the stock prices of 30 actively traded large companies. The oldest and most widely followed index of stock market performance. p. 601

drop-in-the-bucket problem A problem intrinsic to public goods: The good or service is usually so costly that its provision generally does not depend on whether any single person pays. p. 342

dumping A firm’s or an industry’s sale of products on the world market at prices below its own costs of production. p. 674

durable goods Goods that last a relatively long time, such as cars and household appliances. p. 426

dupopoly A two-firm oligopoly. p. 299

easy monetary policy Fed policies that expand the money supply and thus lower interest rates in an effort to stimulate the economy. p. 535

economic growth An increase in the total output of an economy. It occurs when a society acquires new resources or when it learns to produce more using existing resources. p. 14 p. 36

economic income The amount of money a household can spend during a given period without increasing or decreasing its net assets. Wages, salaries, dividends, interest income, transfer payments, rents, and so on are sources of economic income. p. 370

economic integration Occurs when two or more nations join to form a free-trade zone. p. 675

economic theory A statement or set of related statements about cause and effect, action and reaction. p. 10

economics The study of how individuals and societies choose to use the scarce resources that nature and previous generations have provided. p. 2

efficiency In economics, allocative efficiency. An efficient economy is one that produces what people want at the least possible cost. p. 13 p. 254

efficiency wage theory An explanation for unemployment that holds that the productivity of workers increases with the wage rate. If this is so, firms may have an incentive to pay wages above the market-clearing rate. p. 585

efficient market A market in which profit opportunities are eliminated almost instantaneously. p. 3

elastic demand A demand relationship in which the percentage change in quantity demanded is larger than the percentage change in price in absolute value (a demand elasticity with an absolute value greater than 1). p. 100

elasticity A general concept used to quantify the response in one variable when another variable changes. p. 97

elasticity of labor supply A measure of the response of labor supplied to a change in the price of labor. p. 111

elasticity of supply A measure of the response of quantity of a good supplied to a change in price of that good. Likely to be positive in output markets. p. 111

embodied technical change Technical change that results in an improvement in the quality of capital. p. 641

empirical economics The collection and use of data to test economic theories. p. 13

employed Any person 16 years old or older (1) who works for pay, either for someone else or in his or her own business for 1 or more hours per week, (2) who works without pay for 15 or more hours per week in a family enterprise, or (3) who has a job but has been temporarily absent with or without pay. p. 442

terpreneur A person who organizes, manages, and assumes the risks of a firm, taking a new idea or a new product and turning it into a successful business. p. 48

equilibrium The condition that exists when quantity supplied and quantity demanded are equal. At equilibrium, there is no tendency for price to change. In the macroeconomic goods market, equilibrium occurs when planned aggregate expenditure is equal to aggregate output. p. 66 p. 465

equilibrium price level The price level at which the aggregate demand and aggregate supply curves intersect. p. 562

equity Fairness. p. 14 p. 367

estate The property that a person owns at the time of his or her death. p. 396

estate tax A tax on the total value of a person’s estate. p. 396

European Union (EU) The European trading bloc composed of 27 countries. p. 675

excess burden The amount by which the burden of a tax exceeds the total revenue collected. Also called deadweight loss. p. 402

excess demand or shortage The condition that exists when quantity demanded exceeds quantity supplied at the current price. p. 66

excess labor, excess capital Labor and capital that are not needed to produce the firm’s current level of output. p. 625

excess supply or surplus The condition that exists when quantity supplied exceeds quantity demanded at the current price. p. 68

excess reserves The difference between a bank’s actual reserves and its required reserves. p. 508

exchange rate The ratio at which two currencies are traded. The price of one country’s currency in terms of another country’s currency. p. 670 p. 687

exogenous variable A variable that is assumed not to depend on the state of the economy—that is, it does not change when the economy changes. p. 469
expansion or boom The period in the business cycle from a trough up to a peak during which output and employment grow. p. 410

expansionary fiscal policy An increase in government spending or a reduction in net taxes aimed at increasing aggregate output (income) (Y). p. 545

expansionary monetary policy An increase in the money supply aimed at increasing aggregate output (income) (Y). p. 545

expected rate of return The annual rate of return that a firm expects to obtain through a capital investment. p. 243

expected utility The sum of the utilities coming from all possible outcomes of a deal, weighted by the probability of each occurring. p. 355

expected value The sum of the payoffs associated with each possible outcome of a situation weighted by its probability of occurring. p. 354

expenditure approach A method of computing GDP that measures the total amount spent on all final goods and services during a given period. p. 425

explicit contracts Employment contracts that stipulate workers’ wages, usually for a period of 1 to 3 years. p. 585

export promotion A trade policy designed to encourage exports. p. 721

export subsidies Government payments made to domestic firms to encourage exports. p. 673

external economies and diseconomies When industry growth results in a decrease of long-run average costs, there are external economies; when industry growth results in an increase of long-run average costs, there are external diseconomies. p. 210 p. 213

externality A cost or benefit imposed or bestowed on an individual or a group that is outside, or external to, the transaction. p. 263 p. 329

factor endowments The quantity and quality of labor, land, and natural resources of a country. p. 672

factor substitution effect The tendency of firms to substitute away from a factor whose price has risen and toward a factor whose price has fallen. p. 222

factors of production (or factors) The inputs into the process of production. Another term for resources. Land, labor, and capital are the three key factors of production. p. 25 p. 49

fair game or fair bet A game whose expected value is zero. p. 354

fallacy of composition The erroneous belief that what is true for a part is necessarily true for the whole. p. 13

favored customers Those who receive special treatment from dealers during situations of excess demand. p. 84

federal budget The budget of the federal government. p. 487

federal debt The total amount owed by the federal government. p. 491

Federal Open Market Committee (FOMC) A group composed of the seven members of the Fed’s Board of Governors, the president of the New York Federal Reserve Bank, and four of the other 11 district bank presidents on a rotating basis; it sets goals concerning the money supply and interest rates and directs the operation of the Open Market Desk in New York. p. 512

Federal Reserve Bank (the Fed) The central bank of the United States. p. 507

federal surplus (+) or deficit (–) Federal government receipts minus expenditures. p. 488

Federal Trade Commission (FTC) A federal regulatory group created by Congress in 1914 to investigate the structure and behavior of firms engaging in interstate commerce, to determine what constitutes unlawful “unfair” behavior, and to issue cease-and-desist orders to those found in violation of antitrust law. p. 286

fiat, or token, money Items designated as money that are intrinsically worthless. p. 503

final goods and services Goods and services produced for final use. p. 424

financial capital market The complex set of institutions in which suppliers of capital (households that save) and the demand for capital (firms wanting to invest) interact. p. 137 p. 237

financial intermediaries Banks and other institutions that act as a link between those who have money to lend and those who want to borrow money. p. 505

fine-tuning The phrase used by Walter Heller to refer to the government’s role in regulating inflation and unemployment. p. 416

firm An organization that comes into being when a person or a group of people decides to produce a good or service to meet a perceived demand. A firm transforms resources (inputs) into products (outputs). Firms are the primary producing units in a market economy. p. 48 p. 148

fiscal drag The negative effect on the economy that occurs when average tax rates increase because taxpayers have moved into higher income brackets during an expansion. p. 492

fiscal policy Government policies concerning taxes and spending. p. 415 p. 477

Five Forces model A model developed by Michael Porter that helps us understand the five competitive forces that determine the level of competition and profitability in an industry. p. 294

fixed cost Any cost that does not depend on the firms’ level of output. These costs are incurred even if the firm is producing nothing. There are no fixed costs in the long run. p. 168

fixed-weight procedure A procedure that uses weights from a given base year. p. 433

floating, or market-determined, exchange rates Exchange rates that are determined by the unregulated forces of supply and demand. p. 696
food stamps  Vouchers that have a face value greater than their cost and that can be used to purchase food at grocery stores.  p. 383

foreign direct investment (FDI)  Investment in enterprises made in a country by residents outside that country.  p. 640

foreign exchange  All currencies other than the domestic currency of a given country.  p. 688

free enterprise  The freedom of individuals to start and operate private businesses in search of profits.  p. 41

free-rider problem  A problem intrinsic to public goods: Because people can enjoy the benefits of public goods whether or not they pay for them, they are usually unwilling to pay for them.  p. 342

frictional unemployment  The portion of unemployment that is due to the normal working of the labor market; used to denote short-run job/skill matching problems.  p. 446 p. 582

full-employment budget  What the federal budget would be if the economy were producing at the full-employment level of output.  p. 493

game theory  Analyzes the choices made by rival firms, people, and even governments when they are trying to maximize their own well-being while anticipating and reacting to the actions of others in their environment.  p. 301

General Agreement on Tariffs and Trade (GATT)  An international agreement signed by the United States and 22 other countries in 1947 to promote the liberalization of foreign trade.  p. 674

general equilibrium  The condition that exists when all markets in an economy are in simultaneous equilibrium.  p. 254

Gini coefficient  A commonly used measure of the degree of inequality of income derived from a Lorenz curve. It can range from 0 to a maximum of 1.  p. 372

goods market  The market in which goods and services are exchanged and in which the equilibrium level of aggregate output is determined.  p. 541

government consumption and gross investment (G)  Expenditures by federal, state, and local governments for final goods and services.  p. 428

government failure  Occurs when the government becomes the tool of the rent seeker and the allocation of resources is made even less efficient by the intervention of government.  p. 283

government spending multiplier  The ratio of the change in the equilibrium level of output to a change in government spending.  p. 483

graph  A two-dimensional representation of a set of numbers, or data.  p. 17 p. 22

Gramm-Rudman-Hollings Act  Passed by the U.S. Congress and signed by President Reagan in 1986, this law set out to reduce the federal deficit by $36 billion per year, with a deficit of zero slated for 1991.  p. 610

Great Depression  The period of severe economic contraction and high unemployment that began in 1929 and continued throughout the 1930s.  p. 415

gross domestic product (GDP)  The total market value of all final goods and services produced within a given period by factors of production located within a country.  p. 423

gross investment  The total value of all newly produced capital goods (plant, equipment, housing, and inventory) produced in a given period.  p. 428

gross national income (GNI)  GNP converted into dollars using an average of currency exchange rates over several years adjusted for rates of inflation.  p. 436

gross national product (GNP)  The total market value of all final goods and services produced within a given period by factors of production owned by a country’s citizens, regardless of where the output is produced.  p. 425

gross private domestic investment (I)  Total investment in capital—that is, the purchase of new housing, plants, equipment, and inventory by the private (or nongovernment) sector.  p. 427

Heckscher-Ohlin theorem  A theory that explains the existence of a country’s comparative advantage by its factor endowments: A country has a comparative advantage in the production of a product if that country is relatively well endowed with inputs used intensively in the production of that product.  p. 672

Herfindahl-Hirschman Index (HHI)  An index of market concentration found by summing the square of percentage shares of firms in the market.  p. 308

homogenous products  Undifferentiated products; products that are identical to, or indistinguishable from, one another.  p. 119 p. 179

horizontal differentiation  Products differ in ways that make them better for some people and worse for others.  p. 316

households  The consuming units in an economy.  p. 48

human capital  A form of intangible capital that includes the skills and other knowledge that workers have or acquire through education and training and that yields valuable services to a firm over time.  p. 234 p. 368

hyperinflation  A period of very rapid increases in the overall price level.  p. 412

identity  Something that is always true.  p. 461

imperfect information  The absence of full knowledge concerning product characteristics, available prices, and so on.  p. 264

imperfectly competitive industry  An industry in which individual firms have some control over the price of their output.  p. 269

implementation lag  The time it takes to put the desired policy into effect once economists and policy makers recognize that the economy is in a boom or a slump.  p. 608

import substitution  An industrial trade strategy that favors developing local industries that can manufacture goods to replace imports.  p. 720
impossibility theorem A proposition demonstrated by Kenneth Arrow showing that no system of aggregating individual preferences into social decisions will always yield consistent, nonarbitrary results. p. 346
income The sum of all a household’s wages, salaries, profits, interest payments, rents, and other forms of earnings in a given period of time. It is a flow measure. p. 54
income approach A method of computing GDP that measures the income—wages, rents, interest, and profits—received by all factors of production in producing final goods and services. p. 425
income elasticity of demand A measure of the responsiveness of demand to changes in income. p. 110
increasing returns to scale, or economies of scale An increase in a firm’s scale of production leads to lower costs per unit produced. p. 195
increasing-cost industry An industry that encounters external diseconomies—that is, average costs increase as the industry grows. The long-run supply curve for such an industry has a positive slope. p. 212 p. 213
Indifference curve A set of points, each point representing a combination of goods X and Y, all of which yield the same total utility. p. 141 p. 145
indirect taxes minus subsidies Taxes such as sales taxes, customs duties, and license fees less subsidies that the government pays for which it receives no goods or services in return. p. 429
industrial policy A policy in which governments actively pick industries to support as a base for economic development. p. 719
Industrial Revolution The period in England during the late eighteenth and early nineteenth centuries in which new manufacturing technologies and improved transportation gave rise to the modern factory system and a massive movement of the population from the countryside to the cities. p. 4
inelastic demand Demand that responds somewhat, but not a great deal, to changes in price. Inelastic demand always has a numerical value between zero and –1. p. 100
infant industry A young industry that may need temporary protection from competition from the established industries of other countries to develop an acquired comparative advantage. p. 681
inferior goods Goods for which demand tends to fall when income rises. p. 54
inflation An increase in the overall price level. p. 412
inflation rate The percentage change in the price level. p. 589
inflation targeting When a monetary authority chooses its interest rate values with the aim of keeping the inflation rate within some specified band over some specified horizon. p. 576
injunction A court order forbidding the continuation of behavior that leads to damages. p. 336
innovation The use of new knowledge to produce a new product or to produce an existing product more efficiently. p. 642
input or factor markets The markets in which the resources used to produce goods and services are exchanged. p. 48
inputs or resources Anything provided by nature or previous generations that can be used directly or indirectly to satisfy human wants. p. 26
intangible capital Nonmaterial things that contribute to the output of future goods and services. p. 234
interest The payments made for the use of money; The fee that borrowers pay to lenders for the use of their funds. p. 237 p. 525
interest rate Interest payments expressed as a percentage of the loan. p. 238
interest sensitivity or insensitivity of planned investment The responsiveness of planned investment spending to changes in the interest rate. Interest sensitivity means that planned investment spending changes a great deal in response to changes in the interest rate; interest insensitivity means little or no change in planned investment as a result of changes in the interest rate. p. 546
intermediate goods Goods that are produced by one firm for use in further processing by another firm. p. 424
International Monetary Fund (IMF) An international agency whose primary goals are to stabilize international exchange rates and to lend money to countries that have problems financing their international transactions. p. 719
invention An advance in knowledge. p. 642
inventory investment The change in the stock of inventories. p. 625
investment The process of using resources to produce new capital; New capital additions to a firm’s capital stock. Although capital is measured at a given point in time (a stock), investment is measured over a period of time (a flow). The flow of investment increases the capital stock. p. 32 p. 235
IS curve A curve illustrating the negative relationship between the equilibrium value of aggregate output (income) (Y) and the interest rate in the goods market. p. 555 p. 557
isocost line A graph that shows all the combinations of capital and labor available for a given total cost. p. 163 p. 165
isoquant A graph that shows all the combinations of capital and labor that can be used to produce a given amount of output. p. 162 p. 165
J-curve effect Following a currency depreciation, a country’s balance of trade may get worse before it gets better. The graph showing this effect is shaped like the letter J, hence the name J-curve effect. p. 701
labor demand curve A graph that illustrates the amount of labor that firms want to employ at each given wage rate. p. 582
labor force The number of people employed plus the number of unemployed. p. 442
law of diminishing returns  When additional units of a variable input are added to fixed inputs after a certain point, the marginal product of the variable input declines. p. 154

law of one price  If the costs of transportation are small, the price of the same good in different countries should be roughly the same. p. 699

law of supply  The positive relationship between price and quantity of a good supplied: An increase in market price will lead to an increase in quantity supplied, and a decrease in market price will lead to a decrease in quantity supplied. p. 61

legal tender  Money that a government has required to be accepted in settlement of debts. p. 504

lender of last resort  One of the functions of the Fed: It provides funds to troubled banks that cannot find any other sources of funds. p. 512

liability rules  Laws that require A to compensate B for damages imposed. p. 336

life-cycle theory of consumption  A theory of household consumption: Households make lifetime consumption decisions based on their expectations of lifetime income. p. 616

liquidity property of money  The property of money that makes it a good medium of exchange as well as a store of value: It is portable and readily accepted and thus easily exchanged for goods. p. 502

long-run average cost curve (LRAC)  The “envelope” of a series of short-run cost curves. p. 197

long-run competitive equilibrium  When \( P = SRMC = SRAC = LRAC \) and profits are zero. p. 206

long-run industry supply curve (LIRS)  A graph that traces out price and total output over time as an industry expands. p. 212 p. 213

Lorenz curve  A widely used graph of the distribution of income, with cumulative percentage of households plotted along the horizontal axis and cumulative percentage of income plotted along the vertical axis. p. 371

Lucas supply function  The supply function embodies the idea that output (Y) depends on the difference between the actual price level and the expected price level. p. 657

M1, or transactions money  Money that can be directly used for transactions. p. 504

M2, or broad money  M1 plus savings accounts, money market accounts, and other near monies. p. 505

macroeconomics  The branch of economics that examines the economic behavior of aggregates—income, employment, output, and so on—on a national scale. p. 7 p. 409

marginal cost (MC)  The increase in total cost that results from producing 1 more unit of output. Marginal costs reflect changes in variable costs. p. 171

marginal damage cost (MDC)  The additional harm done by increasing the level of an externality-producing activity by 1 unit. If producing product X pollutes the water in a river, MDC is the additional cost imposed by the added pollution that results from increasing output by 1 unit of X per period. p. 333

marginal private cost (MPC)  The amount that a consumer pays to consume an additional unit of a particular good. p. 333

marginal product  The additional output that can be produced by adding one more unit of a specific input, *ceteris paribus*. p. 153
marginal product of labor \( (MP_L) \)  
The additional output produced by 1 additional unit of labor. \( p. 216 \)
marginal propensity to consume \( (MPC) \)  
That fraction of a change in income that is consumed, or spent. \( p. 461 \)
marginal propensity to import \( (MPM) \)  
The change in imports caused by a $1 change in income. \( p. 692 \)
marginal propensity to save \( (MPS) \)  
That fraction of a change in income that is saved. \( p. 461 \)
Marginal rate of substitution \( MU_X/MU_Y; \) the ratio at which a household is willing to substitute good \( Y \) for good \( X. \) \( p. 141 \) \( p. 145 \)
marginal rate of technical substitution  
The rate at which a firm can substitute capital for labor and hold output constant. \( p. 162 \) \( p. 165 \)
marginal rate of transformation \( (MRT) \)  
The slope of the production possibility frontier (ppf). \( p. 35 \)
marginal revenue \( (MR) \)  
The additional revenue that a firm takes in when it increases output by one additional unit. In perfect competition, \( P = MR. \) \( p. 180 \)
marginal revenue product \( (MRP) \)  
The additional revenue a firm earns by employing 1 additional unit of input, \( ceteris paribus. \) \( p. 217 \)
marginal social cost \( (MSC) \)  
The total cost to society of producing an additional unit of a good or service. \( MSC \) is equal to the sum of the marginal costs of producing the product and the correctly measured damage costs involved in the process of production. \( p. 330 \)
marginal tax rate  
The tax rate paid on any additional income earned. \( p. 391 \)
marginal utility \( (MU) \)  
The additional satisfaction gained by the consumption or use of one more unit of a good or service. \( p. 126 \)
marginalism  
The process of analyzing the additional or incremental costs or benefits arising from a choice or decision. \( p. 3 \)
market  
The institution through which buyers and sellers interact and engage in exchange. \( p. 40 \)
market demand  
The sum of all the quantities of a good or service demanded per period by all the households buying in the market for that good or service. \( p. 58 \)
market failure  
Occurs when resources are misallocated, or allocated inefficiently. The result is waste or lost value. \( p. 262 \) \( p. 329 \)
market power  
An imperfectly competitive firm’s ability to raise price without losing all of the quantity demanded for its product. \( p. 269 \)
market signaling  
Actions taken by buyers and sellers to communicate quality in a world of uncertainty. \( p. 360 \)
market supply  
The sum of all that is supplied each period by all producers of a single product. \( p. 65 \)
maximin strategy  
In game theory, a strategy chosen to maximize the minimum gain that can be earned. \( p. 303 \)
mechanism design  
A contract or an institution that aligns the interests of two parties in a transaction. A piece rate, for example, creates incentives for a worker to work hard, just as his or her superior wants. A co-pay in the health care industry encourages more careful use of health care, just as the insurance company wants. \( p. 363 \)
Medicaid and Medicare  
In-kind government transfer programs that provide health and hospitalization benefits: Medicare to the aged and their survivors and to certain of the disabled, regardless of income, and Medicaid to people with low incomes. \( p. 383 \)
medium of exchange, or means of payment  
What sellers generally accept and buyers generally use to pay for goods and services. \( p. 502 \)
microeconomics  
The branch of economics that examines the functioning of individual industries and the behavior of individual decision-making units—that is, firms and households. \( p. 6 \) \( p. 409 \)
midpoint formula  
A more precise way of calculating percentages using the value halfway between \( P_1 \) and \( P_2 \) for the base in calculating the percentage change in price and the value halfway between \( Q_1 \) and \( Q_2 \) as the base for calculating the percentage change in quantity demanded. \( p. 102 \)
minimum efficient scale \( (MES) \)  
The smallest size at which the long-run average cost curve is at its minimum. \( p. 197 \)
minimum wage  
A price floor set for the price of labor; the lowest wage that firms are permitted to pay workers. \( p. 86 \) \( p. 368 \)
minimum wage laws  
Laws that set a floor for wage rates—that is, a minimum hourly rate for any kind of labor. \( p. 587 \)
model  
A formal statement of a theory, usually a mathematical statement of a presumed relationship between two or more variables. \( p. 10 \)
monetary policy  
The tools used by the Federal Reserve to control the quantity of money, which in turn affects interest rates. \( p. 415 \) \( p. 478 \)
money income  
The measure of income used by the Census Bureau. Because money income excludes noncash transfer payments and capital gains income, it is less inclusive than economic income. \( p. 371 \)
money market  
The market in which financial instruments are exchanged and in which the equilibrium level of the interest rate is determined. \( p. 542 \)
money multiplier  
The multiple by which deposits can increase for every dollar increase in reserves; equal to 1 divided by the required reserve ratio. \( p. 510 \)
monopolistic competition  
A common form of industry (market) structure in the United States, characterized by a large number of firms, no barriers to entry, and product differentiation. \( p. 314 \)
moral hazard  
Arises when one party to a contract changes behavior in response to that contract and thus passes on the costs of that behavior change to the other party. \( p. 362 \)
moral suasion  
The pressure that in the past the Fed exerted on member banks to discourage them from borrowing heavily from the Fed. \( p. 517 \)
movement along a demand curve  The change in quantity demanded brought about by a change in price.  p. 58

movement along a supply curve  The change in quantity supplied brought about by a change in price.  p. 63

multiplier  The ratio of the change in the equilibrium level of output to a change in some exogenous variable.  p. 469

NAIRU  The nonaccelerating inflation rate of unemployment.  p. 594

NASDAQ Composite  An index based on the stock prices of over 5,000 companies traded on the NASDAQ Stock Market. The NASDAQ market takes its name from the National Association of Securities Dealers Automated Quotation System.  p. 601

Nash equilibrium  In game theory, the result of all players’ playing their best strategy given what their competitors are doing.  p. 302

national income  The total income earned by the factors of production owned by a country’s citizens.  p. 429

national income and product accounts  Data collected and published by the government describing the various components of national income and output in the economy.  p. 423

natural experiment  Selection of a control versus experimental group in testing the outcome of an intervention is made as a result of an exogenous event outside the experiment itself and unrelated to it.  p. 724

natural monopoly  An industry that realizes such large economies of scale in producing its product that single-firm production of that good or service is most efficient.  p. 278

natural rate of unemployment  The unemployment that occurs as a normal part of the functioning of the economy. Sometimes taken as the sum of frictional unemployment and structural unemployment.  p. 447  p. 593

near monies  Close substitutes for transactions money, such as savings accounts and money market accounts.  p. 505

negative relationship  A relationship between two variables, X and Y, in which a decrease in X is associated with an increase in Y and an increase in X is associated with a decrease in Y.  p. 19  p. 22

net business transfer payments  Net transfer payments by businesses to others.  p. 429

net exports (EX – IM)  The difference between exports (sales to foreigners of U.S.-produced goods and services) and imports (U.S. purchases of goods and services from abroad). The figure can be positive or negative.  p. 429

net exports of goods and services (EX – IM)  The difference between a country’s total exports and total imports.  p. 629

net interest  The interest paid by business.  p. 429

net investment  Gross investment minus depreciation.  p. 428

net national product (NNP)  Gross national product minus depreciation; a nation’s total product minus what is required to maintain the value of its capital stock.  p. 430

net taxes (T)  Taxes paid by firms and households to the government minus transfer payments made to households by the government.  p. 478

network externalities  The value of a product to a consumer increases with the number of that product being sold or used in the market.  p. 280

new Keynesian economics  A field in which models are developed under the assumptions of rational expectations and sticky prices and wages.  p. 659

nominal GDP  Gross domestic product measured in current dollars.  p. 432

nominal wage rate  The wage rate in current dollars.  p. 618

nondurable goods  Goods that are used up fairly quickly, such as food and clothing.  p. 426

nonexcludable  A characteristic of most public goods: Once a good is produced, no one can be excluded from enjoying its benefits.  p. 342

nonlabor, or nonwage, income  Any income received from sources other than working—inheritances, interest, dividends, transfer payments, and so on.  p. 619

nonresidential investment  Expenditures by firms for machines, tools, plants, and so on.  p. 427

nonrival in consumption  A characteristic of public goods: One person’s enjoyment of the benefits of a public good does not interfere with another’s consumption of it.  p. 341

nonsynchronization of income and spending  The mismatch between the timing of money inflow to the household and the timing of money outflow for household expenses.  p. 527

normal goods  Goods for which demand goes up when income is higher and for which demand goes down when income is lower.  p. 54

normal rate of return  A rate of return on capital that is just sufficient to keep owners and investors satisfied. For relatively risk-free firms, it should be nearly the same as the interest rate on risk-free government bonds.  p. 149

normative economics  An approach to economics that analyzes outcomes of economic behavior, evaluates them as good or bad, and may prescribe courses of action. Also called policy economics.  p. 9

North American Free Trade Agreement (NAFTA)  An agreement signed by the United States, Mexico, and Canada in which the three countries agreed to establish all North America as a free-trade zone.  p. 675

not in the labor force  A person who is not looking for work because he or she does not want a job or has given up looking.  p. 442

Ockham’s razor  The principle that irrelevant detail should be cut away.  p. 11
output growth  The growth rate of output of the entire economy.  p. 452  p. 635

outputs  Goods and services of value to households.  p. 26

Pareto efficiency or Pareto optimality  A condition in which no change is possible that will make some members of society better off without making some other members of society worse off.  p. 256

partial equilibrium analysis  The process of examining the equilibrium conditions in individual markets and for households and firms separately.  p. 254

patent  A barrier to entry that grants exclusive use of the patented product or process to the inventor.  p. 279

payoff  The amount that comes from a possible outcome or result.  p. 354

per-capita output growth  The growth rate of output per person in the economy.  p. 452  p. 635

perfect competition  An industry structure in which there are many firms, each being small relative to the industry and producing virtually identical products, and in which no firm is large enough to have any control over prices. In perfectly competitive industries, new competitors can freely enter and exit the market.  p. 119  p. 179

perfect knowledge  The assumption that households possess a knowledge of the qualities and prices of everything available in the market and that firms have all available information concerning wage rates, capital costs, and output prices.  p. 119

perfect price discrimination  Occurs when a firm charges the maximum amount that buyers are willing to pay for each unit.  p. 283

perfect substitutes  Identical products.  p. 55

perfectly elastic demand  Demand in which quantity drops to zero at the slightest increase in price.  p. 99

perfectly inelastic demand  Demand in which quantity demanded does not respond at all to a change in price.  p. 99

permanent income  The average level of a person's expected future income stream.  p. 616

personal consumption expenditures  (C)  Expenditures by consumers on goods and services.  p. 426

personal income  The total income of households.  p. 430

personal saving  The amount of disposable income that is left after total personal spending in a given period.  p. 431

personal saving rate  The percentage of disposable personal income that is saved. If the personal saving rate is low, households are spending a large amount relative to their incomes; if it is high, households are spending cautiously.  p. 432

Phillips Curve  A curve showing the relationship between the inflation rate and the unemployment rate.  p. 589

physical, or tangible, capital  Material things used as inputs in the production of future goods and services. The major categories of physical capital are nonresidential structures, durable equipment, residential structures, and inventories.  p. 233

planned aggregate expenditure (AE)  The total amount the economy plans to spend in a given period. Equal to consumption plus planned investment:  \[ AE = C + I. \]  p. 465

planned investment (I)  Those additions to capital stock and inventory that are planned by firms.  p. 465

policy mix  The combination of monetary and fiscal policies in use at a given time.  p. 548

positive economics  An approach to economics that seeks to understand behavior and the operation of systems without making judgments. It describes what exists and how it works.  p. 9

positive relationship  A relationship between two variables, X and Y, in which a decrease in X is associated with a decrease in Y, and an increase in X is associated with an increase in Y.  p. 19  p. 22
A form of price leadership

A minimum price below which the market system allocates goods and services to consumers when quantity demanded exceeds quantity supplied. p. 79

price surprise Actual price level minus expected price level. p. 657

principle of neutrality All else equal, taxes that are neutral with respect to economic decisions (that is, taxes that do not distort economic decisions) are generally preferable to taxes that distort economic decisions. Taxes that are not neutral impose excess burdens. p. 402

principle of second best The fact that a tax distorts an economic decision does not always imply that such a tax imposes an excess burden. If there are previously existing distortions, such a tax may actually improve efficiency. p. 405

prisoners' dilemma A game in which the players are prevented from cooperating and in which each has a dominant strategy that leaves them both worse off than if they could cooperate. p. 302

privately held federal debt The privately held (non-government-owned) debt of the U.S. government. p. 492

producer price indexes (PPIs) Measures of prices that producers receive for products at all stages in the production process. p. 449

producer surplus The difference between the current market price and the full cost of production for the firm. p. 90

product differentiation A strategy that firms use to achieve market power. Accomplished by producing products that have distinct positive identities in consumers' minds. p. 315

product or output markets The markets in which goods and services are exchanged. p. 48

production The process that transforms scarce resources into useful goods and services. p. 25 p. 147

production function or total product function A numerical or mathematical expression of a relationship between inputs and outputs. It shows units of total product as a function of units of inputs. p. 152

production possibility frontier (ppf) A graph that shows all the combinations of goods and services that can be produced if all of society's resources are used efficiently. p. 33

production technology The quantitative relationship between inputs and outputs. p. 152

productivity growth The growth rate of output per worker. p. 452

productivity of an input The amount of output produced per unit of that input. p. 216

productivity, or labor productivity Output per worker hour; the amount of output produced by an average worker in 1 hour. p. 629

profit The difference between revenues and costs. p. 61 p. 148

progressive tax A tax whose burden, expressed as a percentage of income, increases as income increases. p. 390

property income Income from the ownership of real property and financial holdings. It takes the form of profits, interest, dividends, and rents. p. 369

proportional tax A tax whose burden is the same proportion of income for all households. p. 390

proprietors' income The income of unincorporated businesses. p. 429

protection The practice of shielding a sector of the economy from foreign competition. p. 673

public assistance, or welfare Government transfer programs that provide cash benefits to: (1) families with dependent children whose incomes and assets fall below a very low level, and (2) the very poor regardless of whether they have children. p. 382

public choice theory An economic theory that the public officials who set economic policies and regulate the players act in their own self-interest, just as firms do. p. 283

public goods, (or social or collective goods) Goods and services that bestow collective benefits on members of society. Generally, no one can be excluded from enjoying their benefits. The classic example is national defense. p. 263 p. 341
purchasing-power-parity theory  A theory of international exchange holding that exchange rates are set so that the price of similar goods in different countries is the same.  p. 699

pure monopoly An industry with a single firm that produces a product for which there are no close substitutes and in which significant barriers to entry prevent other firms from entering the industry to compete for profits.  p. 270

pure rent The return to any factor of production that is in fixed supply.  p. 224

quantity demanded The amount (number of units) of a product that a household would buy in a given period if it could buy all it wanted at the current market price.  p. 50

quantity supplied The amount of a particular product that a firm would be willing and able to offer for sale at a particular price during a given time period.  p. 61

quantity theory of money The theory based on the identity \( M \times V = P \times Y \) and the assumption that the velocity of money (\( V \)) is constant (or virtually constant).  p. 650

queuing Waiting in line as a means of distributing goods and services: a nonprice rationing mechanism.  p. 83

quota A limit on the quantity of imports.  p. 674

random experiment (Sometimes referred to as a randomized experiment.) A technique in which outcomes of specific interventions are determined by using the intervention in a randomly selected subset of a sample and then comparing outcomes from the exposed and control group.  p. 724

ration coupons Tickets or coupons that entitle individuals to purchase a certain amount of a given product per month.  p. 84

rational-expectations hypothesis The hypothesis that people know the “true model” of the economy and that they use this model to form their expectations of the future.  p. 656

Rawlsian justice A theory of distributonal justice that concludes that the social contract emerging from the “original position” would call for an income distribution that would maximize the well-being of the worst-off member of society.  p. 379

real business cycle theory An attempt to explain business cycle fluctuations under the assumptions of complete price and wage flexibility and rational expectations. It emphasizes shocks to technology and other shocks.  p. 124

real interest rate The difference between the interest rate on a loan and the inflation rate.  p. 451

real wage rate The amount the nominal wage rate can buy in terms of goods and services.  p. 618

real wealth, or real balance, effect The change in consumption brought about by a change in real wealth that results from a change in the price level.  p. 551

realized capital gain The gain that occurs when the owner of an asset actually sells it for more than he or she paid for it.  p. 600

recession A period during which aggregate output declines. Conventionally, a period in which aggregate output declines for two consecutive quarters.  p. 410

recognition lag The time it takes for policy makers to recognize the existence of a boom or a slump.  p. 608

regressive tax A tax whose burden, expressed as a percentage of income, falls as income increases.  p. 390

relative-wage explanation of unemployment An explanation for sticky wages (and therefore unemployment): If workers are concerned about their wages relative to other workers in other firms and industries, they may be unwilling to accept a wage cut unless they know that all other workers are receiving similar cuts.  p. 585

rent-seeking behavior Actions taken by households or firms to preserve positive profits.  p. 283

rental income The income received by property owners in the form of rent.  p. 429

required reserve ratio The percentage of its total deposits that a bank must keep as reserves at the Federal Reserve.  p. 508

reserves The deposits that a bank has at the Federal Reserve bank plus its cash on hand.  p. 507

residential investment Expenditures by households and firms on new houses and apartment buildings.  p. 427

response lag The time that it takes for the economy to adjust to the new conditions after a new policy is implemented; the lag that occurs because of the operation of the economy itself.  p. 608

risk premium The maximum price a risk-averse person will pay to avoid taking a risk.  p. 348

risk-averse Refers to a person’s preference for a certain payoff over an uncertain one with the same expected value.  p. 356

risk-loving Refers to a person’s preference for an uncertain deal over a certain deal with an equal expected value.  p. 356

risk-neutral Refers to a person’s willingness to take a bet with an expected value of zero.  p. 356

rule of reason The criterion introduced by the Supreme Court in 1911 to determine whether a particular action was illegal (“unreasonable”) or legal (“reasonable”) within the terms of the Sherman Act.  p. 286

run on a bank Occurs when many of those who have claims on a bank (deposits) present them at the same time.  p. 507

scarce Limited.  p. 2

services The things we buy that do not involve the production of physical things, such as legal and medical services and education.  p. 426

shares of stock Financial instruments that give to the holder a share in the firm’s ownership and therefore the right to share in the firm’s profits.  p. 415
shift of a demand curve  The change that takes place in a demand curve corresponding to a new relationship between quantity demanded of a good and price of that good. The shift is brought about by a change in the original conditions. p. 58

shift of a supply curve  The change that takes place in a supply curve corresponding to a new relationship between quantity supplied of a good and the price of that good. The shift is brought about by a change in the original conditions. p. 64

short run  The period of time for which two conditions hold: The firm is operating under a fixed scale (fixed factor) of production, and firms can neither enter nor exit an industry. p. 151

short-run industry supply curve  The sum of the marginal cost curves (above AVC) of all the firms in an industry. p. 194

shut-down point  The lowest point on the average variable cost curve. When price falls below the minimum point on AVC, total revenue is insufficient to cover variable costs and the firm will shut down and bear losses equal to fixed costs. p. 193

slope  A measurement that indicates whether the relationship between variables is positive or negative and how much of a response there is in Y (the variable on the vertical axis) when X (the variable on the horizontal axis) changes. p. 19  p. 22

Smoot-Hawley tariff  The U.S. tariff law of the 1930s, which set the highest tariffs in U.S. history (60 percent). It set off an international trade war and caused the decline in trade that is often considered one of the causes of the worldwide depression of the 1930s. p. 674

social capital, or infrastructure  Capital that provides services to the public. Most social capital takes the form of public works (roads and bridges) and public services (police and fire protection). p. 234

social choice  The problem of deciding what society wants. The process of adding up individual preferences to make a choice for society as a whole. p. 346

social overhead capital  Basic infrastructure projects such as roads, power generation, and irrigation systems. p. 719

social, or implicit, contracts  Unspoken agreements between workers and firms that firms will not cut wages. p. 584

Social Security system  The federal system of social insurance programs. It includes three separate programs that are financed through separate trust funds: the Old Age and Survivors Insurance (OASI) program, the Disability Insurance (DI) program, and the Health Insurance (HI), or Medicare program. p. 381

sources side/uses side  The impact of a tax may be felt on one or the other or on both sides of the income equation. A tax may cause net income to fall (damage on the sources side), or it may cause prices of goods and services to rise so that income buys less (damage on the uses side). p. 397

speculation motive  One reason for holding bonds instead of money: Because the market price of interest-bearing bonds is inversely related to the interest rate, investors may want to hold bonds when interest rates are high with the hope of selling them when interest rates fall. p. 530

spreading overhead  The process of dividing total fixed costs by more units of output. Average fixed cost declines as quantity rises. p. 169

stability  A condition in which national output is growing steadily, with low inflation and full employment of resources. p. 14

stabilization policy  Describes both monetary and fiscal policy, the goals of which are to smooth out fluctuations in output and employment and to keep prices as stable as possible. p. 606

stagflation  A situation of both high inflation and high unemployment. Occurs when output is falling at the same time that prices are rising. p. 416

p. 568

Standard and Poor’s 500 (S&P 500)  An index based on the stock prices of 500 of the largest firms by market value. p. 601

statistical discrepancy  Data measurement error. p. 430

sticky prices  Prices that do not always adjust rapidly to maintain equality between quantity supplied and quantity demanded. p. 409

sticky wages  The downward rigidity of wages as an explanation for the existence of unemployment. p. 584

stock  A share of stock is an ownership claim on a firm, entitling its owner to a profit share. p. 238

store of value  An asset that can be used to transport purchasing power from one time period to another. p. 502

structural deficit  The deficit that remains at full employment. p. 494

structural unemployment  The portion of unemployment that is due to changes in the structure of the economy that result in a significant loss of jobs in certain industries. p. 447  p. 582

substitutes  Goods that can serve as replacements for one another; when the price of one increases, demand for the other increases. p. 55

sunk costs  Costs that cannot be avoided because they have already been incurred. p. 3

supply curve  A graph illustrating how much of a product a firm will sell at different prices. p. 62

supply schedule  A table showing how much of a product firms will sell at alternative prices. p. 61

surplus of government enterprises  Income of government enterprises. p. 429

tacit collusion  Collusion occurs when price- and quantity-fixing agreements among producers are explicit. Tacit collusion occurs when such agreements are implicit. p. 298

tariff  A tax on imports. p. 673

tax base  The measure or value upon which a tax is levied. p. 389

tax incidence  The ultimate distribution of a tax burden. p. 396
**tax multiplier** The ratio of change in the equilibrium level of output to a change in taxes. p. 485

**tax rate structure** The percentage of a tax base that must be paid in taxes—25 percent of income, for example. p. 389

**tax shifting** Occurs when households can alter their behavior and do something to avoid paying a tax. p. 397

**technological change** The introduction of new methods of production or new products intended to increase the productivity of existing inputs or to raise marginal products. p. 228

**terms of trade** The ratio at which a country can trade domestic products for imported products. p. 669

**theory of comparative advantage** Ricardo’s theory that specialization and free trade will benefit all trading parties, even those that may be “absolutely” more efficient producers. p. 28 p. 665

**Tiebout hypothesis** An efficient mix of public goods is produced when local land/ housing prices and taxes come to reflect consumer preferences just as they do in the market for private goods. p. 346

**tight monetary policy** Fed policies that contract the money supply and thus raise interest rates in an effort to restrain the economy. p. 535

**time lags** Delays in the economy’s response to stabilization policies. p. 607

**time series graph** A graph illustrating how a variable changes over time. p. 17 p. 22

**tit-for-tat strategy** A repeated game strategy in which a player responds in kind to an opponent’s play. p. 304

**total cost (TC)** Total fixed costs plus total variable costs. p. 168

**total cost (total economic cost)** The total of (1) out-of-pocket costs and (2) opportunity cost of all factors of production. p. 148

**total fixed costs (TFC) or overhead** The total of all costs that do not change with output even if output is zero. p. 168

**total revenue (TR)** The amount received from the sale of the product; The price per unit times the quantity of output the firm decides to produce ($P \times q$). p. 148 p. 180

**total utility** The total amount of satisfaction obtained from consumption of a good or service. p. 126

**total variable cost (TVC)** The total of all costs that vary with output in the short run. p. 169

**total variable cost curve** A graph that shows the relationship between total variable cost and the level of a firm’s output. p. 170

**trade deficit** Occurs when a country’s exports of goods and services are less than its imports of goods and services in a given period. p. 664 p. 689

**trade feedback effect** The tendency for an increase in the economic activity of one country to lead to a worldwide increase in economic activity, which then feeds back to that country. p. 694

**trade surplus** The situation when a country exports more than it imports. p. 664

**tragedy of commons** The idea that collective ownership may not provide the proper private incentives for efficiency because individuals do not bear the full costs of their own decisions but do enjoy the full benefits. p. 729

**transaction motive** The main reason that people hold money—to buy things. p. 527

**transfer payments** Cash payments made by the government to people who do not supply goods, services, or labor in exchange for these payments. They include Social Security benefits, veterans’ benefits, and welfare payments. p. 370 p. 413

**Treasury bonds, notes, and bills** Promissory notes issued by the federal government when it borrows money. p. 415

**U.S.-Canadian Free Trade Agreement** An agreement in which the United States and Canada agreed to eliminate all barriers to trade between the two countries by 1998. p. 675

**unconstrained supply of labor** The amount a household would like to work within a given period at the current wage rate if it could find the work. p. 620

**underground economy** The part of the economy in which transactions take place and in which income is generated that is unreported and therefore not counted in GDP. p. 436

**unemployed** A person 16 years old or older who is not working, is available for work, and has made specific efforts to find work during the previous 4 weeks. p. 442

**unemployment compensation** A state government transfer program that pays cash benefits for a certain period of time to laid-off workers who have worked for a specified period of time for a covered employer. p. 383

**unemployment rate** The percentage of the labor force that is unemployed. That is, the ratio of the number of people unemployed to the total number of people in the labor force. p. 411 p. 442 p. 582

**unit of account** A standard unit that provides a consistent way of quoting prices. p. 502

**unitary elasticity** A demand relationship in which the percentage change in quantity of a product demanded is the same as the percentage change in price in absolute value (a demand elasticity of –1). p. 100

**utilitarian justice** The idea that “a dollar in the hand of a rich person is worth less than a dollar in the hand of a poor person.” If the marginal utility of income declines with income, transferring income from the rich to the poor will increase total utility. p. 379

**utility** The satisfaction a product yields. p. 126

**utility possibilities frontier** A graphic representation of a two-person world that shows all points at which I’s utility can be increased only if J’s utility is decreased. p. 376

**utility-maximizing rule** Equating the ratio of the marginal utility of a good to its price for all goods. p. 129
**value added**  The difference between the value of goods as they leave a stage of production and the cost of the goods as they entered that stage.  p. 424

**variable**  A measure that can change from time to time or from observation to observation.  p. 10

**variable cost**  A cost that depends on the level of production chosen.  p. 168

**velocity of money**  The number of times a dollar bill changes hands, on average, during a year; the ratio of nominal GDP to the stock of money.  p. 650

**vertical differentiation**  A product difference that, from everyone’s perspective, makes a product better than rival products.  p. 318

**vicious-circle-of-poverty hypothesis**  Suggests that poverty is self-perpetuating because poor nations are unable to save and invest enough to accumulate the capital stock that would help them grow.  p. 716

**voting paradox**  A simple demonstration of how majority-rule voting can lead to seemingly contradictory and inconsistent results. A commonly cited illustration of the kind of inconsistency described in the impossibility theorem.  p. 347

**wealth or net worth**  The total value of what a household owns minus what it owes. It is a stock measure.  p. 54

**weight**  The importance attached to an item within a group of items.  p. 432

**World Bank**  An international agency that lends money to individual countries for projects that promote economic development.  p. 719

**World Trade Organization (WTO)**  A negotiating forum dealing with rules of trade across nations.  p. 674

**X-axis**  On a Cartesian coordinate system, the horizontal line against which a variable is plotted.  p. 18  p. 22

**X-intercept**  The point at which a graph intersects the X-axis.  p. 18  p. 22

**Y-axis**  On a Cartesian coordinate system, the vertical line against which a variable is plotted.  p. 18  p. 22

**Y-intercept**  The point at which a graph intersects the Y-axis.  p. 18  p. 22
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MICROECONOMIC STRUCTURE

The organization of the microeconomics chapters continues to reflect the authors’ belief that the best way to understand how market economies operate—and the best way to understand basic economic theory—is to work through a simple model of a perfectly competitive market system first, including discussions of output markets (goods and services) and input markets (land, labor, and capital), and the connections between them. Only then do the authors turn to noncompetitive market structures such as monopoly and oligopoly. When students have worked through a simple model of a perfectly competitive market system, they begin to understand how the pieces of the economy “fit together.” Learning perfect competition first also enables students to see the power of the market system. It is impossible to discuss the efficiency of markets as well as the problems that arise from markets until students have seen how a simple perfectly competitive market produces and distributes goods and services. The accompanying visual gives you an overview of the structure.

CHAPTERS 6–8 provide an overview of firm and household decision making in simple perfectly competitive markets.

CHAPTERS 9–11 show how firms and households interact in output markets (goods and services) and input markets (labor, land, and capital) to determine prices, wages, and profits.

CHAPTER 12 is a pivotal chapter that links simple perfectly competitive markets with a discussion of market imperfections and the role of government.

CHAPTERS 13–19 cover the three noncompetitive market structures (monopoly, oligopoly, and monopolistic competition), externalities, public goods, uncertainty and asymmetric information, and income distribution as well as taxation and government finance.
The organization of the macroeconomics chapters continues to reflect the authors’ view that in order for students to understand aggregate demand and aggregate supply curves, they must first understand how the goods market and the money market function. The logic behind the simple demand curve is wrong when applied to the relationship between aggregate demand and the price level. Similarly, the logic behind the simple supply curve is wrong when applied to the relationship between aggregate supply and the price level.

The authors believe the best way to teach the reasoning embodied in the aggregate demand and aggregate supply curves without creating serious confusion is to build up to them carefully. The accompanying visual gives you an overview of the macroeconomic structure.

**CHAPTERS 23–24** examine the market for goods and services.

**CHAPTERS 25–26** examine the money market.

**CHAPTER 27** brings the two markets together, explaining the links between aggregate output \( (Y) \) and the interest rate \( (r) \), and how to derive the aggregate demand curve.

**CHAPTER 28** introduces the aggregate supply curve and how to determine the price level \( (P) \).

**CHAPTER 29** shows how the labor market fits into this macroeconomic picture.

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**The Goods-and-Services Market**
- Planned aggregate expenditure
  - Consumption \( (C) \)
  - Planned investment \( (I) \)
  - Government \( (G) \)
- Aggregate output (income) \( (Y) \)

**The Money Market**
- The supply of money
- The demand for money
- Interest rate \( (r) \)

**Aggregate Demand**
- Aggregate demand curve

**Aggregate Supply**
- Aggregate supply curve
  - Equilibrium interest rate \( (r^*) \)
  - Equilibrium output (income) \( (Y^*) \)
  - Equilibrium price level \( (P^*) \)

**Connections between the goods-and-services market and the money market**

\[ r \leftrightarrow Y \]

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ECONOMICS IN PRACTICE FEATURE

To help pique students’ interest in the economic world, the authors include the chapter feature entitled Economics in Practice. This feature either (1) describes a personal observation or a research idea and provides an analysis using the concepts of the chapter or (2) presents a newspaper excerpt that relates to the concepts of the chapter.

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