Since World War II, government policymakers have tried to promote high employment without causing inflation. If the economy experiences a recession such as the one that began in March 2001, policymakers have two principal sets of tools that they can use to affect aggregate economic activity: monetary policy, the control of interest rates or the money supply, and fiscal policy, the control of government spending and taxes.

The ISLM model can help policymakers predict what will happen to aggregate output and interest rates if they decide to increase the money supply or increase government spending. In this way, ISLM analysis enables us to answer some important questions about the usefulness and effectiveness of monetary and fiscal policy in influencing economic activity.

But which is better? When is monetary policy more effective than fiscal policy at controlling the level of aggregate output, and when is it less effective? Will fiscal policy be more effective if it is conducted by changing government spending rather than changing taxes? Should the monetary authorities conduct monetary policy by manipulating the money supply or interest rates?

In this chapter, we use the ISLM model to help answer these questions and to learn how the model generates the aggregate demand curve featured prominently in the aggregate demand and supply framework (examined in Chapter 22), which is used to understand changes not only in aggregate output but also in the price level. Our analysis will show why economists focus so much attention on topics such as the stability of the demand for money function and whether the demand for money is strongly influenced by interest rates.

First, however, let’s examine the ISLM model in more detail to see how the IS and LM curves developed in Chapter 20 shift and the implications of these shifts. (We continue to assume that the price level is fixed so that real and nominal quantities are the same.)

### FACTORS THAT CAUSE THE IS CURVE TO SHIFT

You have already learned that the IS curve describes equilibrium points in the goods market—the combinations of aggregate output and interest rate for which aggregate output produced equals aggregate demand. The IS curve shifts whenever a change in autonomous factors (factors independent of aggregate output) occurs that is unrelated to the interest rate. (A change in the interest rate that affects equilibrium aggregate output causes only a movement along the IS curve.) We have already identified five candidates
as autonomous factors that can shift aggregate demand and hence affect the level of equilibrium output. We can now ask how changes in each of these factors affect the IS curve.

1. Changes in Autonomous Consumer Expenditure. A rise in autonomous consumer expenditure shifts aggregate demand upward and shifts the IS curve to the right (see Figure 1). To see how this shift occurs, suppose that the IS curve is initially at IS\(_1\) in panel (a) and a huge oil field is discovered in Wyoming, perhaps containing more oil than fields in Saudi Arabia. Consumers now become more optimistic about the future health of the economy, and autonomous consumer expenditure rises. What happens to the equilibrium level of aggregate output as a result of this rise in autonomous consumer expenditure when the interest rate is held constant at \(i_A\)?

**FIGURE 1**
**Shift in the IS Curve**
The IS curve will shift from IS\(_1\) to IS\(_2\), as a result of (1) an increase in autonomous consumer spending, (2) an increase in planned investment spending due to business optimism, (3) an increase in government spending, (4) a decrease in taxes, or (5) an increase in net exports that is unrelated to interest rates. Panel (b) shows how changes in these factors lead to the rightward shift in the IS curve using a Keynesian cross diagram. For any given interest rate (here \(i_A\)), these changes shift the aggregate demand function upward and raise equilibrium output from \(Y_A\) to \(Y_{A'}\).
The IS₁ curve tells us that equilibrium aggregate output is at $Y_A$ when the interest rate is at $i_A$ (point A). Panel (b) shows that this point is an equilibrium in the goods market because the aggregate demand function $Y_{ad}^1$ at an interest rate $i_A$ crosses the $45^\circ$ line $Y = Y^{ad}$ at an aggregate output level of $Y_A$. When autonomous consumer expenditure rises because of the oil discovery, the aggregate demand function shifts upward to $Y_{ad}^2$ and equilibrium output rises to $Y_A'$. This rise in equilibrium output from $Y_A$ to $Y_A'$ when the interest rate is $i_A$ is plotted in panel (a) as a movement from point A to point A'. The same analysis can be applied to every point on the initial IS₁ curve; therefore, the rise in autonomous consumer expenditure shifts the IS curve to the right from IS₁ to IS₂ in panel (a).

A decline in autonomous consumer expenditure reverses the direction of the analysis. For any given interest rate, the aggregate demand function shifts downward, the equilibrium level of aggregate output falls, and the IS curve shifts to the left.

2. Changes in Investment Spending Unrelated to the Interest Rate. In Chapter 20, we learned that changes in the interest rate affect planned investment spending and hence the equilibrium level of output. This change in investment spending merely causes a movement along the IS curve and not a shift. A rise in planned investment spending unrelated to the interest rate (say, because companies become more confident about investment profitability after the Wyoming oil discovery) shifts the aggregate demand function upward, as in panel (b) of Figure 1. For any given interest rate, the equilibrium level of aggregate output rises, and the IS curve shifts to the right, as in panel (a).

A decrease in investment spending because companies become more pessimistic about investment profitability shifts the aggregate demand function downward for any given interest rate; the equilibrium level of aggregate output falls, shifting the IS curve to the left.

3. Changes in Government Spending. An increase in government spending will also cause the aggregate demand function at any given interest rate to shift upward, as in panel (b). The equilibrium level of aggregate output rises at any given interest rate, and the IS curve shifts to the right. Conversely, a decline in government spending shifts the aggregate demand function downward, and the equilibrium level of output falls, shifting the IS curve to the left.

4. Changes in Taxes. Unlike changes in other factors that directly affect the aggregate demand function, a decline in taxes shifts the aggregate demand function by raising consumer expenditure and shifting the aggregate demand function upward at any given interest rate. A decline in taxes raises the equilibrium level of aggregate output at any given interest rate and shifts the IS curve to the right (as in Figure 1). Recall, however, that a change in taxes has a smaller effect on aggregate demand than an equivalent change in government spending. So for a given change in taxes, the IS curve will shift less than for an equal change in government spending.

A rise in taxes lowers the aggregate demand function and reduces the equilibrium level of aggregate output at each interest rate. Therefore, a rise in taxes shifts the IS curve to the left.

5. Changes in Net Exports Unrelated to the Interest Rate. As with planned investment spending, changes in net exports arising from a change in interest rates merely cause a movement along the IS curve and not a shift. An autonomous rise in net exports unrelated to the interest rate—say, because American-made jeans become more chic than French-made jeans—shifts the aggregate demand function upward and causes the IS curve to shift to the right, as in Figure 1. Conversely, an autonomous fall in net exports shifts the aggregate demand function downward, and the equilibrium level of output falls, shifting the IS curve to the left.
The **LM** curve describes the equilibrium points in the market for money—the combinations of aggregate output and interest rate for which the quantity of money demanded equals the quantity of money supplied. Whereas five factors can cause the **IS** curve to shift (changes in autonomous consumer expenditure, planned investment spending unrelated to the interest rate, government spending, taxes, and net exports unrelated to the interest rate), only two factors can cause the **LM** curve to shift: autonomous changes in money demand and changes in the money supply. How do changes in these two factors affect the **LM** curve?

1. **Changes in the Money Supply.** A rise in the money supply shifts the **LM** curve to the right, as shown in Figure 2. To see how this shift occurs, suppose that the **LM** curve is initially at **LM**\(_1\) in panel (a) and the Federal Reserve conducts open market purchases that increase the money supply. If we consider point A, which is on the initial **LM**\(_1\) curve, we can examine what happens to the equilibrium level of the interest rate, holding output constant at **YA**.

Panel (b), which contains a supply and demand diagram for the market for money, depicts the equilibrium interest rate initially as **i\(_A\)** at the intersection of the supply curve for money **M\(_s\)** and the demand curve for money **M\(_d\)**. The rise in the quantity of money supplied shifts the supply curve to **M\(_s\)**, and, holding output constant at **YA**, the equilibrium interest rate falls to **i\(_A'\)**. In panel (a), this decline in the equilibrium interest rate from **i\(_A\)** to **i\(_A'\)** is shown as a movement from point A to point A'. The same analysis can

---

**FIGURE 2** *Shift in the LM Curve from an Increase in the Money Supply*

The **LM** curve shifts to the right from **LM**\(_1\) to **LM**\(_2\) when the money supply increases because, as indicated in panel (b), at any given level of aggregate output (say, **YA**), the equilibrium interest rate falls (point A to A').
be applied to every point on the initial $LM_1$ curve, leading to the conclusion that at any given level of aggregate output, the equilibrium interest rate falls when the money supply increases. Thus $LM_2$ is below and to the right of $LM_1$.

Reversing this reasoning, a decline in the money supply shifts the $LM$ curve to the left. A decline in the money supply results in a shortage of money at points on the initial $LM$ curve. This condition of excess demand for money can be eliminated by a rise in the interest rate, which reduces the quantity of money demanded until it again equals the quantity of money supplied.

2. **Autonomous Changes in Money Demand.** The theory of asset demand outlined in Chapter 5 indicates that there can be an autonomous rise in money demand (that is, a change not caused by a change in the price level, aggregate output, or the interest rate). For example, an increase in the volatility of bond returns would make bonds riskier relative to money and would increase the quantity of money demanded at any given interest rate, price level, or amount of aggregate output. The resulting autonomous increase in the demand for money shifts the $LM$ curve to the left, as shown in Figure 3. Consider point A on the initial $LM_1$ curve. Suppose that a massive financial panic occurs, sending many companies into bankruptcy. Because bonds have become a riskier asset, people want to shift from holding bonds to holding money; they will hold more money at all interest rates and output levels. The resulting increase in money demand at an output level of $Y_A$ is shown by the shift of the money demand curve from $M_d^1$ to $M_d^2$ in panel (b). The new equilibrium in the market for money now indicates that if aggregate output is constant at $Y_A$, the equilibrium interest rate will rise to $i_{A'}$, and the point of equilibrium moves from A to $A'$.

![Figure 3](image-url)

**Figure 3**  
**Shift in the $LM$ Curve When Money Demand Increases**  
The $LM$ curve shifts to the left from $LM_1$ to $LM_2$ when money demand increases because, as indicated in panel (b), at any given level of aggregate output (say, $Y_A$), the equilibrium interest rate rises (point A to $A'$).
Conversely, an autonomous decline in money demand would lead to a rightward shift in the LM curve. The fall in money demand would create an excess supply of money, which is eliminated by a rise in the quantity of money demanded that results from a decline in the interest rate.

**CHANGES IN EQUILIBRIUM LEVEL OF THE INTEREST RATE AND AGGREGATE OUTPUT**

You can now use your knowledge of factors that cause the IS and LM curves to shift for the purpose of analyzing how the equilibrium levels of the interest rate and aggregate output change in response to changes in monetary and fiscal policies.

**Response to a Change in Monetary Policy**

Figure 4 illustrates the response of output and interest rate to an increase in the money supply. Initially, the economy is in equilibrium for both the goods market and the market for money at point 1, the intersection of IS$_1$ and LM$_1$. Suppose that at the resulting level of aggregate output $Y_1$, the economy is suffering from an unemployment rate of 10%, and the Federal Reserve decides it should try to raise output and reduce unemployment by raising the money supply. Will the Fed's change in monetary policy have the intended effect?

The rise in the money supply causes the LM curve to shift rightward to LM$_2$, and the equilibrium point for both the goods market and the market for money moves to point 2 (intersection of IS$_1$ and LM$_2$). As a result of an increase in the money supply, the interest rate declines to $i_2$, as we found in Figure 2, and aggregate output rises to $Y_2$; the Fed's policy has been successful in improving the health of the economy.

**FIGURE 4**

Response of Aggregate Output and the Interest Rate to an Increase in the Money Supply

The increase in the money supply shifts the LM curve to the right from LM$_1$ to LM$_2$; the economy moves to point 2, where output has increased to $Y_2$ and the interest rate has declined to $i_2$. 
For a clear understanding of why aggregate output rises and the interest rate declines, think about exactly what has happened in moving from point 1 to point 2. When the economy is at point 1, the increase in the money supply (rightward shift of the LM curve) creates an excess supply of money, resulting in a decline in the interest rate. The decline causes investment spending and net exports to rise, which in turn raises aggregate demand and causes aggregate output to rise. The excess supply of money is eliminated when the economy reaches point 2 because both the rise in output and the fall in the interest rate have raised the quantity of money demanded until it equals the new higher level of the money supply.

A decline in the money supply reverses the process; it shifts the LM curve to the left, causing the interest rate to rise and output to fall. Accordingly, aggregate output is positively related to the money supply; aggregate output expands when the money supply increases and falls when it decreases.

Response to a Change in Fiscal Policy

Suppose that the Federal Reserve is not willing to increase the money supply when the economy is suffering from a 10% unemployment rate at point 1. Can the federal government come to the rescue and manipulate government spending and taxes to raise aggregate output and reduce the massive unemployment?

The ISLM model demonstrates that it can. Figure 5 depicts the response of output and the interest rate to an expansionary fiscal policy (increase in government spending or decrease in taxes). An increase in government spending or a decrease in taxes causes the IS curve to shift to IS₂, and the equilibrium point for both the goods market and the market for money moves to point 2 (intersection of IS₂ with LM₁). The result of the change in fiscal policy is a rise in aggregate output to Y₂ and a rise in the interest rate to i₂. Note the difference in the effect on the interest rate between an expansionary fiscal policy.
policy and an expansionary monetary policy. In the case of an expansionary fiscal policy, the interest rate rises, whereas in the case of an expansionary monetary policy, the interest rate falls.

Why does an increase in government spending or a decrease in taxes move the economy from point 1 to point 2, causing a rise in both aggregate output and the interest rate? An increase in government spending raises aggregate demand directly; a decrease in taxes makes more income available for spending and raises aggregate demand by raising consumer expenditure. The resulting increase in aggregate demand causes aggregate output to rise. The higher level of aggregate output raises the quantity of money demanded, creating an excess demand for money, which in turn causes the interest rate to rise. At point 2, the excess demand for money created by a rise in aggregate output has been eliminated by a rise in the interest rate, which lowers the quantity of money demanded.

A contractionary fiscal policy (decrease in government spending or increase in taxes) reverses the process described in Figure 5; it causes aggregate demand to fall, which shifts the IS curve to the left and causes both aggregate output and the interest rate to fall. Aggregate output and the interest rate are positively related to government spending and negatively related to taxes.

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**STUDY GUIDE**

As a study aid, Table 1 indicates the effect on aggregate output and interest rates of a change in the seven factors that shift the IS and LM curves. In addition, the table provides schematics describing the reason for the output and interest-rate response. ISLM analysis is best learned by practicing applications. To get this practice, you might try to develop the reasoning for your own Table 1 in which all the factors decrease rather than increase or answer Problems 5–7 and 13–15 at the end of this chapter.

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**EFFECTIVENESS OF MONETARY VERSUS FISCAL POLICY**

Our discussion of the effects of fiscal and monetary policy suggests that a government can easily lift an economy out of a recession by implementing any of a number of policies (changing the money supply, government spending, or taxes). But how can policymakers decide which of these policies to use if faced with too much unemployment? Should they decrease taxes, increase government spending, raise the money supply, or do all three? And if they decide to increase the money supply, by how much? Economists do not pretend to have all the answers, and although the ISLM model will not clear the path to aggregate economic bliss, it can help policymakers decide which policies may be most effective under certain circumstances.

**Monetary Policy Versus Fiscal Policy: The Case of Complete Crowding Out**

The ISLM model developed so far in this chapter shows that both monetary and fiscal policy affect the level of aggregate output. To understand when monetary policy is more effective than fiscal policy, we will examine a special case of the ISLM model in which
### TABLE 1 Effects from Factors That Shift the IS and LM Curves

<table>
<thead>
<tr>
<th>Factor</th>
<th>Autonomous Change in Factor</th>
<th>Response</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer expenditure, C</td>
<td>↑</td>
<td>Y ↑, i ↑</td>
<td>C ↑ ⇒ Yaut ↑ ⇒ IS shifts right</td>
</tr>
<tr>
<td>Investment, I</td>
<td>↑</td>
<td>Y ↑, i ↑</td>
<td>I ↑ ⇒ Yaut ↑ ⇒ IS shifts right</td>
</tr>
<tr>
<td>Government spending, G</td>
<td>↑</td>
<td>Y ↑, i ↑</td>
<td>G ↑ ⇒ Yaut ↑ ⇒ IS shifts right</td>
</tr>
<tr>
<td>Taxes, T</td>
<td>↑</td>
<td>Y ↓, i ↓</td>
<td>T ↑ ⇒ C ↓ ⇒ Yaut ↓ ⇒ IS shifts left</td>
</tr>
<tr>
<td>Net exports, NX</td>
<td>↑</td>
<td>Y ↑, i ↑</td>
<td>NX ↑ ⇒ Yaut ↑ ⇒ IS shifts right</td>
</tr>
<tr>
<td>Money supply, M'</td>
<td>↑</td>
<td>Y ↑, i ↓</td>
<td>M'↑ ⇒ i ↓ ⇒ LM shifts right</td>
</tr>
<tr>
<td>Money demand, Md'</td>
<td>↑</td>
<td>Y ↓, i ↑</td>
<td>Md'↑ ⇒ i ↑ ⇒ LM shifts left</td>
</tr>
</tbody>
</table>

**Note:** Only increases (↑) in the factors are shown. The effect of decreases in the factors would be the opposite of those indicated in the “Response” column.
money demand is unaffected by the interest rate (money demand is said to be interest-inelastic) so that monetary policy affects output but fiscal policy does not.

Consider the slope of the $LM$ curve if the demand for money is unaffected by changes in the interest rate. If point 1 in panel (a) of Figure 6 is such that the quantity of money demanded equals the quantity of money supplied, then it is on the $LM$ curve. If the interest rate rises to, say, $i_2$, the quantity of money demanded is unaffected, and it will continue to equal the unchanged quantity of money supplied only if aggregate output remains unchanged at $Y_1$ (point 2). Equilibrium in the market for money will occur at the same level of aggregate output regardless of the interest rate, and the $LM$ curve will be vertical, as shown in both panels of Figure 6.

Suppose that the economy is suffering from a high rate of unemployment, which policymakers try to eliminate with either expansionary fiscal or monetary policy. Panel
(a) depicts what happens when an expansionary fiscal policy (increase in government spending or cut in taxes) is implemented, shifting the IS curve to the right from $IS_1$ to $IS_2$. As you can see in panel (a), the fiscal expansion has no effect on output; aggregate output remains at $Y_1$ when the economy moves from point 1 to point 2.

In our earlier analysis, expansionary fiscal policy always increased aggregate demand and raised the level of output. Why doesn’t that happen in panel (a)? The answer is that because the LM curve is vertical, the rightward shift of the IS curve raises the interest rate to $i_2$, which causes investment spending and net exports to fall enough to offset completely the increased spending of the expansionary fiscal policy. Put another way, increased spending that results from expansionary fiscal policy has crowded out investment spending and net exports, which decrease because of the rise in the interest rate. This situation in which expansionary fiscal policy does not lead to a rise in output is frequently referred to as a case of complete crowding out.\(^1\)

Panel (b) shows what happens when the Federal Reserve tries to eliminate high unemployment through an expansionary monetary policy (increase in the real money supply, $M/P$). Here the LM curve shifts to the right from $LM_1$ to $LM_2$, because at each interest rate, output must rise so that the quantity of money demanded rises to match the increase in the money supply. Aggregate output rises from $Y_1$ to $Y_2$ (the economy moves from point 1 to point 2), and expansionary monetary policy does affect aggregate output in this case.

We conclude from the analysis in Figure 6 that if the demand for money is unaffected by changes in the interest rate (money demand is interest-inelastic), monetary policy is effective but fiscal policy is not. An even more general conclusion can be reached: The less interest-sensitive money demand is, the more effective monetary policy is relative to fiscal policy.\(^2\)

Because the interest sensitivity of money demand is important to policymakers’ decisions regarding the use of monetary or fiscal policy to influence economic activity, the subject has been studied extensively by economists and has been the focus of many debates. Findings on the interest sensitivity of money demand are discussed in Chapter 19.

**APPLICATION**

**Targeting Money Supply Versus Interest Rates**

In the 1970s and early 1980s, central banks in many countries pursued a strategy of monetary targeting—that is, they used their policy tools to make the money supply equal a target value. However, as we saw in Chapter 16, many of these central banks abandoned monetary targeting in the 1980s to pursue interest-rate targeting instead because of the breakdown of the stable relationship between the money supply and economic activity. The ISLM model has important implications for which variable a central bank

\(^1\)When the demand for money is affected by the interest rate, the usual case in which the LM curve slopes upward but is not vertical, some crowding out occurs. The rightward shift of the IS curve also raises the interest rate, which causes investment spending and net exports to fall somewhat. However, as Figure 5 indicates, the rise in the interest rate is not sufficient to reduce investment spending and net exports to the point where aggregate output does not increase. Thus expansionary fiscal policy increases aggregate output, and only partial crowding out occurs.

\(^2\)This result and many others in this and the previous chapter can be obtained more directly by using algebra. An algebraic treatment of the ISLM model can be found in an appendix to this chapter, which is on this book’s web site at www.myeconlab.com/mishkin.
should target and we can apply it to explain why central banks have abandoned monetary targeting for interest-rate targeting.

As we saw in Chapter 16, when the Federal Reserve attempts to hit a reserve aggregate or a money supply target, it cannot at the same time pursue an interest-rate target; it can hit one target or the other but not both. Consequently, it needs to know which of these two targets will produce more accurate control of aggregate output.

In contrast to the textbook world you have been inhabiting, in which the IS and LM curves are assumed to be fixed, the real world is one of great uncertainty in which IS and LM curves shift because of unanticipated changes in autonomous spending and money demand. To understand whether the Fed should use a money supply target or an interest-rate target, we need to look at two cases: one in which uncertainty about the IS curve is far greater than uncertainty about the LM curve, and another in which uncertainty about the LM curve is far greater than uncertainty about the IS curve.

The ISLM diagram in Figure 7 illustrates the outcome of the two targeting strategies for the case in which the IS curve is unstable and uncertain, so it fluctuates around its expected value of IS* from IS' to IS", while the LM curve is stable and certain, so it stays at LM*. Because the central bank knows that the expected position of the IS curve is at IS* and desires aggregate output of Y*, it will set its interest-rate target at i* so that the expected level of output is Y*. This policy of targeting the interest rate at i* is labeled “Interest-Rate Target.”

### Figure 7
**Money Supply and Interest-Rate Targets When the IS Curve Is Unstable and the LM Curve Is Stable**
The unstable IS curve fluctuates between IS' and IS". The money supply target produces smaller fluctuations in output (Y_M to Y_M) than the interest-rate target (Y_I to Y_I). Therefore, the money supply target is preferred.

---

How would the central bank keep the interest rate at its target level of \( i^* \)? Recall from Chapter 16 that the Fed can hit its interest-rate target by buying and selling bonds when the interest rate differs from \( i^* \). When the IS curve shifts out to \( IS^0 \), the interest rate would rise above \( i^* \) with the money supply unchanged. To counter this rise in interest rates, however, the central bank would need to buy bonds just until their price is driven back up so that the interest rate comes back down to \( i^* \). (The result of these open market purchases, as we have seen in Chapters 13 and 14, is that the monetary base and the money supply rise until the \( LM \) curve shifts to the right to intersect the \( IS^0 \) curve at \( i^* \)—not shown in the diagram for simplicity.) When the interest rate is below \( i^* \), the central bank needs to sell bonds to lower their price and raise the interest rate back up to \( i^* \). (These open market sales reduce the monetary base and the money supply until the \( LM \) curve shifts to the left to intersect the IS curve at \( i^* \)—again not shown in the diagram.) The result of pursuing the interest-rate target is that aggregate output fluctuates between \( Y_I^9 \) and \( Y_I^0 \) in Figure 7.

If, instead, the Fed pursues a money supply target, it will set the money supply so that the resulting \( LM \) curve \( LM^* \) intersects the \( IS^* \) curve at the desired output level of \( Y^* \). This policy of targeting the money supply is labeled “Money Supply Target.” Because it is not changing the money supply and so keeps the \( LM \) curve at \( LM^* \), aggregate output will fluctuate between \( Y^*_M \) and \( Y^*_M \) under the money supply target policy.

As you can see in the figure, the money supply target leads to smaller output fluctuations around the desired level than the interest-rate target. A rightward shift of the IS curve to \( IS^0 \), for example, causes the interest rate to rise, given a money supply target, and this rise in the interest rate leads to a lower level of investment spending and net exports and hence to a smaller increase in aggregate output than occurs under an interest-rate target. Because smaller output fluctuations are desirable, the conclusion is that if the IS curve is more unstable than the \( LM \) curve, a money supply target is preferred.

The outcome of the two targeting strategies for the case of a stable IS curve and an unstable \( LM \) curve caused by unanticipated changes in money demand is illustrated in Figure 8. Again, the interest-rate and money supply targets are set so that the expected level of aggregate output equals the desired level \( Y^* \). Because the \( LM \) curve is now unstable, it fluctuates between \( LM' \) and \( LM'' \) even when the money supply is fixed, causing aggregate output to fluctuate between \( Y^*_M \) and \( Y^*_M \).

The interest-rate target, by contrast, is not affected by uncertainty about the \( LM \) curve, because it is set by the Fed’s adjustment of the money supply whenever the interest rate tries to depart from \( i^* \). When the interest rate begins to rise above \( i^* \) because of an increase in money demand, the central bank again just buys bonds, driving up their price and bringing the interest rate back down to \( i^* \). The result of these open market purchases is a rise in the monetary base and the money supply. Similarly, if the interest rate falls below \( i^* \), the central bank sells bonds to lower their price and raise the interest rate back to \( i^* \), thereby causing a decline in the monetary base and the money supply. The only effect of the fluctuating \( LM \) curve, then, is that the money supply fluctuates more as a result of the interest-rate target policy. The outcome of the interest-rate target is that output will be exactly at the desired level with no fluctuations.

Because smaller output fluctuations are desirable, the conclusion from Figure 8 is that if the \( LM \) curve is more unstable than the IS curve, an interest-rate target is preferred.

We can now see why many central banks decided to abandon monetary targeting for interest-rate targeting in the 1980s. With the rapid proliferation of new financial instruments whose presence can affect the demand for money (see Chapter 19), money demand (which is embodied in the \( LM \) curve) became highly unstable in many countries.
Thus central banks in these countries recognized that they were more likely to be in the situation depicted in Figure 8 and decided that they would be better off with an interest-rate target than a money supply target.  

4It is important to recognize, however, that the crucial factor in deciding which target is preferred is the relative instability of the IS and LM curves. Although the LM curve has been unstable recently, the evidence supporting a stable IS curve is also weak. Instability in the money demand function does not automatically mean that money supply targets should be abandoned for an interest-rate target. Furthermore, the analysis so far has been conducted assuming that the price level is fixed. More realistically, when the price level can change, so that there is uncertainty about expected inflation, the case for an interest-rate target is less strong. As we learned in Chapters 4 and 5, the interest rate that is more relevant to investment decisions is not the nominal interest rate but the real interest rate (the nominal interest rate minus expected inflation). Hence when expected inflation rises, at each given nominal interest rate, the real interest rate falls and investment and net exports rise, shifting the IS curve to the right. Similarly, a fall in expected inflation raises the real interest rate at each given nominal interest rate, lowers investment and net exports, and shifts the IS curve to the left. In the real world, expected inflation undergoes large fluctuations, so the IS curve in Figure 8 will also have substantial fluctuations, making it less likely that the interest-rate target is preferable to the money supply target.
tendency to rise or fall. When output is above the natural rate level, the booming economy will cause prices to rise; when output is below the natural rate level, the slack in the economy will cause prices to fall.

Because we now want to examine what happens when the price level changes, we can no longer assume that real and nominal values are the same. The spending variables that affect the IS curve (consumer expenditure, investment spending, government spending, and net exports) describe the demand for goods and services and are in real terms; they describe the physical quantities of goods that people want to buy. Because these quantities do not change when the price level changes, a change in the price level has no effect on the IS curve, which describes the combinations of the interest rate and aggregate output in real terms that satisfy goods market equilibrium.

Figure 9 shows what happens in the ISLM model when output rises above the natural rate level, which is marked by a vertical line at $Y_n$. Suppose that initially the IS and LM curves intersect at point 1, where output $Y = Y_n$. Panel (a) examines what happens to output and interest rates when there is a rise in the money supply. As we saw in Figure 2, the rise in the money supply causes the LM curve to shift rightward to $LM_2$, and the equilibrium moves to point 2 (the intersection of $IS_1$ and $LM_2$), where the interest rate falls to $i_2$ and output rises to $Y_2$. However, as we can see in panel (a), the level of output at $Y_2$ is greater than the natural rate level $Y_n$, and so the price level begins to rise.

**Figure 9 The ISLM Model in the Long Run**

In panel (a), a rise in the money supply causes the LM curve to shift rightward to $LM_2$, and the equilibrium moves to point 2, where the interest rate falls to $i_2$ and output rises to $Y_2$. Because output at $Y_2$ is above the natural rate level $Y_n$, the price level rises, the real money supply falls, and the LM curve shifts back to $LM_1$; the economy has returned to the original equilibrium at point 1. In panel (b), an increase in government spending shifts the IS curve to the right to $IS_2$, and the economy moves to point 2, at which the interest rate has risen to $i_2$ and output has risen to $Y_2$. Because output at $Y_2$ is above the natural rate level $Y_n$, the price level begins to rise, real money balances $M/P$ begin to fall, and the LM curve shifts to the left to $LM_2$. The long-run equilibrium at point $2'$ has an even higher interest rate at $i_{2'}$, and output has returned to $Y_n$. 
In contrast to the IS curve, which is unaffected by a rise in the price level, the LM curve is affected by the price level rise because the liquidity preference theory states that the demand for money in real terms depends on real income and interest rates. This makes sense because money is valued in terms of what it can buy. However, the money supply the media reports in dollars is not the money supply in real terms; it is a nominal quantity. As the price level rises, the quantity of money in real terms falls, and the effect on the LM curve is identical to a fall in the nominal money supply with the price level fixed. The lower value of the real money supply creates an excess demand for money, causing the interest rate to rise at any given level of aggregate output, and the LM curve shifts back to the left. As long as the level of output exceeds the natural rate level, the price level will continue to rise, shifting the LM curve to the left, until finally output is back at the natural rate level $Y_n$. This occurs when the LM curve has returned to $LM_1$, where real money balances $M/P$ have returned to the original level and the economy has returned to the original equilibrium at point 1. The result of the expansion in the money supply in the long run is that the economy has the same level of output and interest rates.

The fact that the increase in the money supply has left output and interest rates unchanged in the long run is referred to as long-run monetary neutrality. The only result of the increase in the money supply is a higher price level, which has increased proportionally to the increase in the money supply so that real money balances $M/P$ are unchanged.

Panel (b) looks at what happens to output and interest rates when there is expansionary fiscal policy such as an increase in government spending. As we saw earlier, the increase in government spending shifts the IS curve to the right to $IS_2$, and in the short run the economy moves to point 2 (the intersection of $IS_2$ and $LM_1$), where the interest rate has risen to $i_2$ and output has risen to $Y_2$. Because output at $Y_2$ is above the natural rate level $Y_n$, the price level begins to rise, real money balances $M/P$ begin to fall, and the LM curve shifts to the left. Only when the LM curve has shifted to $LM_2$ and the equilibrium is at point 2’, where output is again at the natural rate level $Y_n$, does the price level stop rising and the LM curve come to rest. The resulting long-run equilibrium at point 2’ has an even higher interest rate at $i_2’$ and output has not risen from $Y_n$. Indeed, what has occurred in the long run is complete crowding out: The rise in the price level, which has shifted the LM curve to $LM_2$, has caused the interest rate to rise to $i_2’$, causing investment and net exports to fall enough to offset the increased government spending completely. What we have discovered is that even though complete crowding out does not occur in the short run in the ISLM model (when the LM curve is not vertical), it does occur in the long run.

Our conclusion from examining what happens in the ISLM model from an expansionary monetary or fiscal policy is that although monetary and fiscal policy can affect output in the short run, neither affects output in the long run. Clearly, an important issue in deciding on the effectiveness of monetary and fiscal policy to raise output is how soon the long run occurs. This is a topic that we explore in the next chapter.
between the price level and quantity of aggregate output for which the goods market and the market for money are in equilibrium, called the aggregate demand curve. This aggregate demand curve is a central element in the aggregate supply and demand analysis of Chapter 22, which allows us to explain changes not only in aggregate output but also in the price level.

**Deriving the Aggregate Demand Curve**

Now that you understand how a change in the price level affects the LM curve, we can analyze what happens in the ISLM diagram when the price level changes. This exercise is carried out in Figure 10. Panel (a) contains an ISLM diagram for a given value of the nominal money supply. Let us first consider a price level of \( P_1 \). The LM curve at this price level is \( LM(P_1) \), and its intersection with the IS curve is at point 1, where output is \( Y_1 \). The equilibrium output level \( Y_1 \) that occurs when the price level is \( P_1 \) is also plotted in panel (b) as point 1. If the price level rises to \( P_2 \), then in real terms the money supply has fallen. The effect on the LM curve is identical to a decline in the nominal money supply when the price level is fixed: The LM curve will shift leftward to \( LM(P_2) \). The new equilibrium level of output has fallen to \( Y_2 \), because planned investment and net exports fall when the interest rate rises. Point 2 in panel (b) plots this level of output for price level \( P_2 \). A further increase in the price level to \( P_3 \) causes a further decline in the real money supply, leading to a further increase in the interest rate and a further decline in planned investment and net exports, and output declines to \( Y_3 \). Point 3 in panel (b) plots this level of output for price level \( P_3 \).

**FIGURE 10 Deriving the Aggregate Demand Curve**

The ISLM diagram in panel (a) shows that with a given nominal money supply as the price level rises from \( P_1 \) to \( P_2 \) to \( P_3 \), the LM curve shifts to the left, and equilibrium output falls. The combinations of the price level and equilibrium output from panel (a) are then plotted in panel (b), and the line connecting them is the aggregate demand curve \( AD \).
The line that connects the three points in panel (b) is the aggregate demand curve $AD$, and it indicates the level of aggregate output consistent with equilibrium in the goods market and the market for money at any given price level. This aggregate demand curve has the usual downward slope, because a higher price level reduces the money supply in real terms, raises interest rates, and lowers the equilibrium level of aggregate output.

Factors That Cause the Aggregate Demand Curve to Shift

ISLM analysis demonstrates how the equilibrium level of aggregate output changes for a given price level. A change in any factor (except a change in the price level) that causes the IS or LM curve to shift causes the aggregate demand curve to shift. To see how this works, let’s first look at what happens to the aggregate demand curve when the IS curve shifts.

Shifts in the IS Curve. Five factors cause the IS curve to shift: changes in autonomous consumer spending, changes in investment spending related to business confidence, changes in government spending, changes in taxes, and autonomous changes in net exports. How changes in these factors lead to a shift in the aggregate demand curve is examined in Figure 11.

Suppose that initially the aggregate demand curve is at $AD_1$ and there is a rise in, for example, government spending. The ISLM diagram in panel (b) shows what then

**FIGURE 11** Shift in the Aggregate Demand Curve Caused by a Shift in the IS Curve
Expansionary fiscal policy, a rise in net exports, or more optimistic consumers and firms shift the IS curve to the right in panel (b), and at a price level of $P_A$, equilibrium output rises from $Y_A$ to $Y'_A$. This change in equilibrium output is shown as a movement from point A to point A’ in panel (a); hence the aggregate demand curve shifts to the right, from $AD_1$ to $AD_2$. 
happens to equilibrium output, holding the price level constant at $P_A$. Initially, equilibrium output is at $Y_A$ at the intersection of $IS_1$ and $LM_1$. The rise in government spending (holding the price level constant at $P_A$) shifts the IS curve to the right and raises equilibrium output to $Y_A'$. In panel (a), this rise in equilibrium output is shown as a movement from point A to point A', and the aggregate demand curve shifts to the right (to $AD_2$).

The conclusion from Figure 11 is that any factor that shifts the IS curve shifts the aggregate demand curve in the same direction. Therefore, “animal spirits” that encourage a rise in autonomous consumer spending or planned investment spending, a rise in government spending, a fall in taxes, or an autonomous rise in net exports—all of which shift the IS curve to the right—will also shift the aggregate demand curve to the right. Conversely, a fall in autonomous consumer spending, a fall in planned investment spending, a fall in government spending, a rise in taxes, or a fall in net exports will cause the aggregate demand curve to shift to the left.

**Shifts in the LM Curve.** Shifts in the LM curve are caused by either an autonomous change in money demand (not caused by a change in $P$, $Y$, or $i$) or a change in the money supply. Figure 12 shows how either of these changes leads to a shift in the aggregate demand curve. Again, we are initially at the $AD_1$ aggregate demand curve, and we look at what happens to the level of equilibrium output when the price level is held constant at $P_A$. A rise in the money supply shifts the LM curve to the right and raises

![Shift in the Aggregate Demand Curve Caused by a Shift in the LM Curve](image)

**FIGURE 12** Shift in the Aggregate Demand Curve Caused by a Shift in the LM Curve
A rise in the money supply or a fall in money demand shifts the LM curve to the right in panel (b), and at a price level of $P_A$, equilibrium output rises from $Y_A$ to $Y_A'$. This change in equilibrium output is shown as a movement from point A to point A' in panel (a); hence the aggregate demand curve shifts to the right, from $AD_1$ to $AD_2$. 
equilibrium output to \( Y_A' \). This rise in equilibrium output is shown as a movement from point A to point A’ in panel (a), and the aggregate demand curve shifts to the right.

Our conclusion from Figure 12 is similar to that of Figure 11: **Holding the price level constant, any factor that shifts the LM curve shifts the aggregate demand curve in the same direction.** Therefore, a decline in money demand as well as an increase in the money supply, both of which shift the LM curve to the right, also shift the aggregate demand curve to the right. The aggregate demand curve will shift to the left, however, if the money supply declines or money demand rises.

You have now derived and analyzed the aggregate demand curve—an essential element in the aggregate demand and supply framework that we examine in Chapter 22. The aggregate demand and supply framework is particularly useful, because it demonstrates how the price level is determined and enables us to examine factors that affect aggregate output when the price level varies.

### SUMMARY

1. The IS curve is shifted to the right by a rise in autonomous consumer spending, a rise in planned investment spending related to business confidence, a rise in government spending, a fall in taxes, or an autonomous rise in net exports. A movement in the opposite direction of these five factors will shift the IS curve to the left.

2. The LM curve is shifted to the right by a rise in the money supply or an autonomous fall in money demand; it is shifted to the left by a fall in the money supply or an autonomous rise in money demand.

3. A rise in the money supply raises equilibrium output, but lowers the equilibrium interest rate. Expansionary fiscal policy (a rise in government spending or a fall in taxes) raises equilibrium output, but, in contrast to expansionary monetary policy, also raises the interest rate.

4. The less interest-sensitive money demand is, the more effective monetary policy is relative to fiscal policy.

5. The ISLM model provides the following conclusion about the conduct of monetary policy: When the IS curve is more unstable than the LM curve, pursuing a money supply target provides smaller output fluctuations than pursuing an interest-rate target and is preferred; when the LM curve is more unstable than the IS curve, pursuing an interest-rate target leads to smaller output fluctuations and is preferred.

6. The conclusion from examining what happens in the ISLM model from an expansionary monetary or fiscal policy is that although monetary and fiscal policy can affect output in the short run, neither affects output in the long run.

7. The aggregate demand curve tells us the level of aggregate output consistent with equilibrium in the goods market and the market for money for any given price level. It slopes downward because a lower price level creates a higher level of the real money supply, lowers the interest rate, and raises equilibrium output. The aggregate demand curve shifts in the same direction as a shift in the IS or LM curve, hence it shifts to the right when government spending increases, taxes decrease, “animal spirits” encourage consumer and business spending, autonomous net exports increase, the money supply increases, or money demand decreases.

### KEY TERMS

- aggregate demand curve, p. 17
- complete crowding out, p. 11
- long-run monetary neutrality, p. 16
- natural rate level of output, p. 14
QUESTIONS AND PROBLEMS

Questions marked with an asterisk are answered at the end of the book in an appendix, “Answers to Selected Questions and Problems.” Questions marked with a blue circle indicate the question is available in MyEconLab at www.myeconlab.com/mishkin.

1. If taxes and government spending rise by equal amounts, what will happen to the position of the IS curve? Explain this outcome with a Keynesian cross diagram.

2. What happened to the IS curve during the Great Depression when investment spending collapsed? Why?

3. What happens to the position of the LM curve if the Fed decides that it will decrease the money supply to fight inflation and if, at the same time, the demand for money falls?

4. “An excess demand for money resulting from a rise in the demand for money can be eliminated only by a rise in the interest rate.” Is this statement true, false, or uncertain? Explain your answer.

5. In late 1969, the Federal Reserve reduced the money supply while the government raised taxes. What do you think should have happened to interest rates and aggregate output?

6. The high level of interest rates and the rapidly growing economy during Ronald Reagan’s third and fourth years as president can be explained by a tight monetary policy combined with an expansionary fiscal policy. Do you agree with this statement? Why or why not?

7. Suppose that the Federal Reserve wants to keep interest rates from rising when the government sharply increases military spending. How can the Fed do this?

8. Evidence indicates that lately the demand for money has become quite unstable. Why is this finding important to Federal Reserve policymakers?

9. “As the price level rises, the equilibrium level of output determined in the ISLM model also rises.” Is this statement true, false, or uncertain? Explain your answer.

10. What will happen to the position of the aggregate demand curve if the money supply is reduced when government spending increases?

11. How will an equal rise in government spending and taxes affect the position of the aggregate demand curve?

12. If money demand is unaffected by changes in the interest rate, what effect will a rise in government spending have on the position of the aggregate demand curve?

Using Economic Analysis to Predict the Future

13. Predict what will happen to interest rates and aggregate output if a stock market crash causes autonomous consumer expenditure to fall.

14. Predict what will happen to interest rates and aggregate output when there is an autonomous export boom.

15. If a series of defaults in the bond market make bonds riskier and as a result the demand for money rises, predict what will happen to interest rates and aggregate output.

WEB EXERCISES

1. We can continue our study of the ISLM framework by reviewing a dynamic interactive site. Go to http://nova.umuc.edu/~black/econ0.html. Assume that the change in government spending is $25, the tax rate is 30%, the velocity of money is 12, and the money supply is increased by $2. What is the resulting change in interest rates? (Be sure to check the button above ISLM.)

2. An excellent way to learn about how changes in various factors affect the IS and LM curves is to visit www.fgn.unisg.ch/eurmacro/tutor/ism.html. This site, sponsored by the World Bank, allows you to make changes and to observe immediately their impact on the ISLM model.

   a. Increase G from 200 to 600. What happens to the interest rate?
   b. Reduce t to 0.1. What happens to aggregate output Y?
   c. Increase M to 450. What happens to the interest rate and aggregate output?
WEB REFERENCES

http://ingrimayne.saintjoe.edu/econ/optional/ISLM/Limitations.html
A paper discussing limitations of ISLM analysis.

www.bothell.washington.edu/faculty/danby/islm/animation.html
An animated explanation of ISLM.

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