

Chapter 28

Fiscal and Monetary Interactions

After studying this chapter, you will be able to:

- ◆ Describe macroeconomic equilibrium for a given fiscal policy and monetary policy
- ◆ Explain how fiscal policy influences aggregate demand given monetary policy
- ◆ Explain how monetary policy influences aggregate demand given fiscal policy
- ◆ Explain the relative effectiveness of fiscal policy and monetary policy
- ◆ Explain the interaction of monetary policy and fiscal policy at full employment
- ◆ Explain the effects of fiscal policy and monetary policy that are coordinated or in conflict



Harmony and Discord

Do fiscal and monetary policies need to be coordinated so that they work in harmony? Or can the government's fiscal policy and the Bank of England's monetary policy play their own tunes in discord? If a recession is looming, is a tax cut just as good as an

interest rate cut to get the economy moving? Or is one more powerful than the other? And to rein in inflation, is a tax rise just as good as a rise in the interest rate? When the government has a budget deficit, must the interest rate rise or can the Bank of England just print more money to cover the deficit?

Macroeconomic Equilibrium

Our goal in this chapter is to learn how changes in government expenditure and changes in the quantity of money interact to change real GDP, the price level and the interest rate. But before we study the effects of *changes* in these policy variables, we must describe the state of the economy with a given level of government expenditure and a given quantity of money.

The Basic Idea

Aggregate demand and short-run aggregate supply determine real GDP and the price level. And the demand for and supply of real money determine the interest rate. But aggregate demand and the money market are linked together.

Other things remaining the same, the greater the level of aggregate demand the higher is real GDP and the price level. A higher real GDP means a greater demand for money; a higher price level means a smaller supply of real money; so a greater level of aggregate demand means a higher interest rate.

Aggregate demand depends on the interest rate. The reason is that consumption expenditure, investment and net exports are influenced by the interest rate (see Chapter 27, pp. 614–616). So, other things remaining the same, the lower the interest rate, the greater is aggregate demand.

Only one level of aggregate demand and one interest rate are consistent with each other in macroeconomic equilibrium. Figure 28.1 describes this unique equilibrium.

AS–AD Equilibrium

In Figure 28.1(a) the intersection of the aggregate demand curve, *AD*, and the short-run aggregate supply curve, *SAS*, determines real GDP at £1,000 billion and the price level at 110.

The equilibrium amounts of consumption expenditure, investment, government expenditures and net exports lie behind the *AD* curve. But some components of these expenditures are influenced by the interest rate. And the interest rate, in turn, is determined by equilibrium in the money market. Assume that interest-sensitive expenditures total £100 billion, government expenditure is £100 billion, and the rest of real GDP totals £800 billion.

Money Market Equilibrium and Interest-sensitive Expenditure

In Figure 28.1(b) the intersection of the demand for money curve, *MD*, and the supply of money curve, *MS*, determines the interest rate at 5 per cent a year. (We're assuming that the central bank targets the quantity of money so that the *MS* curve is vertical.)

The position of the *MD* curve depends on the level of real GDP. Suppose that the demand for money curve shown in the figure describes the demand for money when real GDP is £1,000 billion, which is equilibrium real GDP in Figure 28.1(a).

The position of the *MS* curve depends on the quantity of nominal money and the price level. Suppose that the supply of money curve shown in the figure describes the supply of real money when the price level is 110, which is the equilibrium price level in Figure 28.1(a).

In Figure 28.1(c), the *IE* curve determines the level of interest-sensitive expenditure at the equilibrium interest rate of 5 per cent a year. Interest-sensitive expenditure is £100 billion, which is the level of this expenditure that lies behind the aggregate demand curve *AD* in Figure 28.1(a).

Check the Equilibrium

The *AS–AD* equilibrium in Figure 28.1(a), the money market equilibrium in Figure 28.1(b), and interest-sensitive expenditure in Figure 28.1(c) are consistent with each other. And there is no other equilibrium.

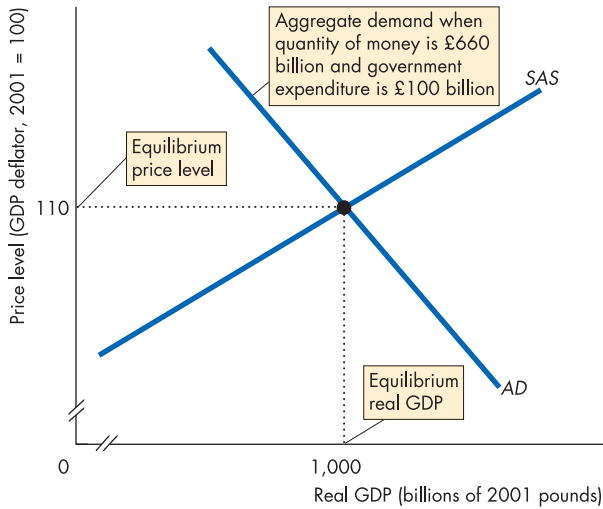
To check this claim, assume that aggregate demand is less than *AD* in Figure 28.1(a) so that real GDP is less than £1,000 billion. If this assumption is correct, the demand for money curve lies to the left of *MD* in Figure 28.1(b) and the equilibrium interest rate is less than 5 per cent a year. With an interest rate less than 5 per cent a year, interest-sensitive expenditure exceeds the £100 billion in Figure 28.1(c). If interest-sensitive expenditure exceeds £100 billion, the *AD* curve lies to the right of the one shown in Figure 28.1(a) and equilibrium real GDP exceeds £1,000 billion. So if we assume a real GDP of less than £1,000 billion, equilibrium real GDP is greater than £1,000 billion. There is an inconsistency. The assumed equilibrium real GDP is too small.

Now assume that aggregate demand is greater than *AD* in Figure 28.1(a) so that real GDP exceeds £1,000 billion. If this assumption is correct, the demand for money curve lies to the right of *MD* in Figure 28.1(b) and the equilibrium interest rate exceeds 5 per cent a year. With an interest rate above 5 per cent a year,

Figure 28.1



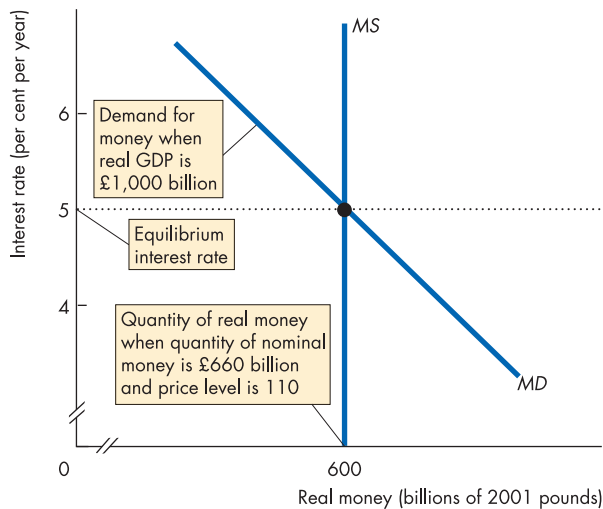
Equilibrium Real GDP, Price Level, Interest Rate and Expenditure



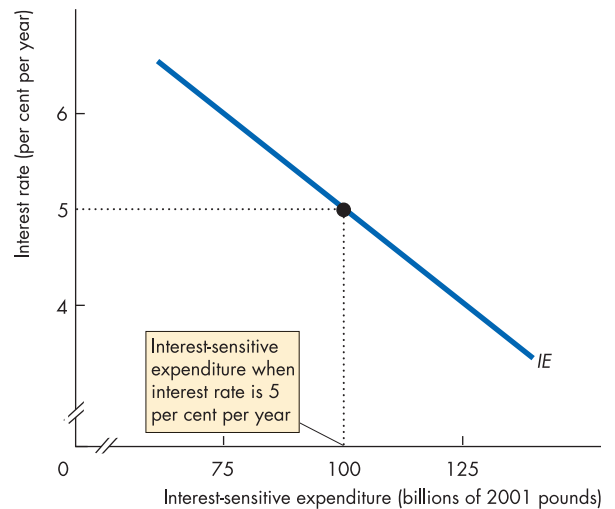
(a) Aggregate supply and aggregate demand

In part (a), the intersection of the aggregate demand curve, AD , and the short-run aggregate supply curve, SAS , determines real GDP at £1,000 billion and the price level at 110. Behind the AD curve, interest-sensitive expenditure is £100 billion, government expenditure is £100 billion and the rest of real GDP is £800 billion.

In part (b), when real GDP is £1,000 billion, the demand for money is MD and when the price level is 110, the supply of (real) money is MS . The intersection of the demand for money curve, MD , and the supply of money curve, MS , determines the interest rate at 5 per cent a year. In part (c), on the IE curve, interest-sensitive expenditure is £100 billion at the equilibrium interest rate of 5 per cent a year.



(b) Money and the interest rate



(c) Expenditure and the interest rate

interest-sensitive expenditure is less than the £100 billion in Figure 28.1(c), in which case the AD curve must lie to the left of the one shown in Figure 28.1(a) and equilibrium real GDP must be smaller than £1,000 billion. So if we assume that real GDP exceeds £1,000 billion, equilibrium real GDP is less than £1,000 billion. There is another inconsistency. The assumed equilibrium real GDP is too large.

Only one level of aggregate demand delivers the same money market equilibrium and $AS-AD$ equilibrium. In

this example, it is the aggregate demand curve AD in Figure 28.1(a). Assuming this level of aggregate demand implies this level of aggregate demand. Assuming a smaller level of aggregate demand implies a larger level. And assuming a larger level of aggregate demand implies a smaller level.

Now that you understand how aggregate demand and the interest rate are simultaneously determined, let's study the effects of a change in government expenditures.

Fiscal Policy in the Short Run

Real GDP growth is slowing, and the government is concerned that a recession is likely. So the government decides to head off the recession by using fiscal policy to stimulate aggregate demand. A fiscal policy that increases aggregate demand is called an *expansionary fiscal policy*.

The effects of an expansionary fiscal policy are similar to those of throwing a pebble into a pond. There's an initial splash followed by a series of ripples that become ever smaller. The initial splash is the "first round effect" of the fiscal policy action. The ripples are the "second round effects". You've already met the first round effects in Chapter 25, pp. 566–569, so here is a refresher.

First Round Effects of Fiscal Policy

The economy starts out in the position shown in Figure 28.1. Real GDP is £1,000 billion, the price level is 110, the interest rate is 5 per cent a year, and interest-sensitive expenditure is £100 billion.

The government now increases its expenditures on goods and services by £100 billion. Figure 28.2 shows the first round effects of this action.

The increase in government expenditures has a multiplier effect because it induces an increase in consumption expenditure. (The government expenditures multiplier is explained in Chapter 25, pp. 560–562.) Let's assume that the multiplier is 2, so a £100 billion increase in government expenditure increases aggregate demand at a given price level by £200 billion. The aggregate demand curve shifts rightward from AD_0 to AD_1 . At a price level of 110, the quantity of real GDP demanded increases from £1,000 billion to £1,200 billion.

If the price level remained constant, real GDP would increase to £1,200. But the price level does rise and the economy heads off in the direction of the intersection of AD_1 and SAS . Real GDP starts to increase and the price level starts to rise.

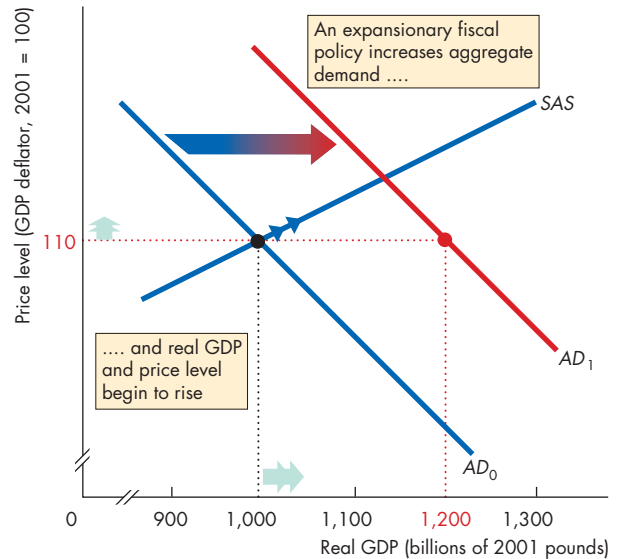
These are the first round effects of expansionary fiscal policy.

Second Round Effects of Fiscal Policy

Increasing real GDP and rising price level bring changes in the money market that creates second round effects. Through the second round, real GDP increases and

Figure 28.2

First Round Effects of an Expansionary Fiscal Policy



Initially, the aggregate demand curve is AD_0 , real GDP is £1,000 billion and the price level is 110. A £100 billion increase in government expenditures on goods and services has a multiplier effect and increases aggregate demand by £200 billion. The aggregate demand curve shifts rightward to AD_1 . Real GDP begins to increase and the price level begins to rise. These are the first round effects of an expansionary fiscal policy.

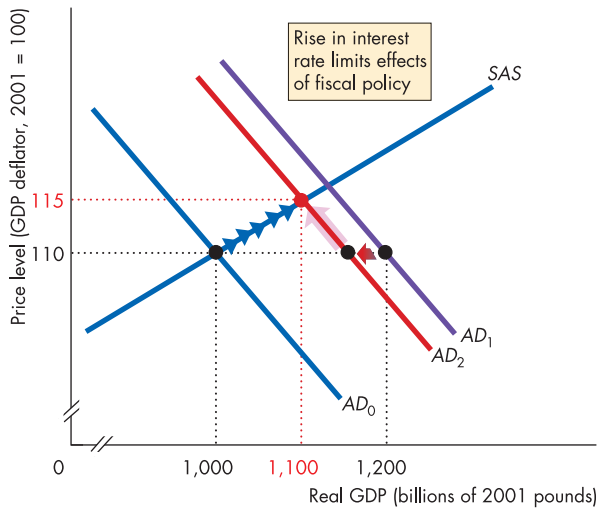
the price level rises until a new macroeconomic equilibrium is reached. But to find that equilibrium and to describe the changes that result from the initial increase in government expenditures, we must keep track of further changes in the money market and in expenditure plans.

It is easier to keep track of the second round effects if we split them into two parts: one that results from the increasing real GDP and the other that results from the rising price level. We follow these effects in Figure 28.3.

First, the increasing real GDP increases the demand for money. In Figure 28.3(b), the demand for money curve shifts rightward. Eventually, it shifts to MD_1 and the interest rate rises to 6 per cent a year. At this interest rate, interest-sensitive expenditure decreases to £75 billion in Figure 28.3(c). The decrease in planned expenditure decreases aggregate demand and the aggregate demand curve shifts leftward to AD_2 in Figure 28.3(a).

Figure 28.3

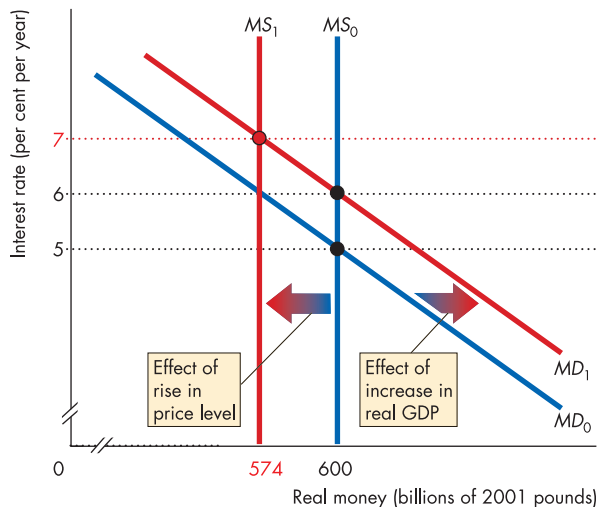
Second Round Effects of an Expansionary Fiscal Policy



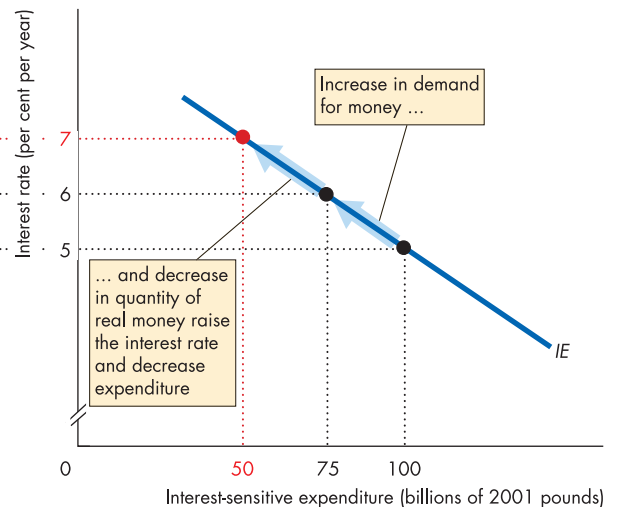
(a) Aggregate supply and aggregate demand

Initially, the demand curve for money is MD_0 , the supply curve of real money is MS_0 and the interest rate is 5 per cent a year in part (b). With an interest rate of 5 per cent a year, interest-sensitive expenditure is £100 billion on the curve IE in part (c). With the increased government expenditures, the aggregate demand curve is AD_1 in part (a). Real GDP is increasing, and the price level is rising.

The increasing real GDP increases the demand for money and the demand for money curve shifts rightward to MD_1 in part (b). The higher interest rate decreases interest-sensitive expenditure in part (c), which decreases aggregate demand to AD_2 in part (a). The rising price level brings a movement along the new AD curve. It does so because the rising price level decreases the supply of real money to MS_1 , which in turn raises the interest rate further and decreases expenditure. The new equilibrium occurs when real GDP has increased to £1,100 billion and the price level has risen to 115.



(b) Money and the interest rate



(c) Expenditure and the interest rate

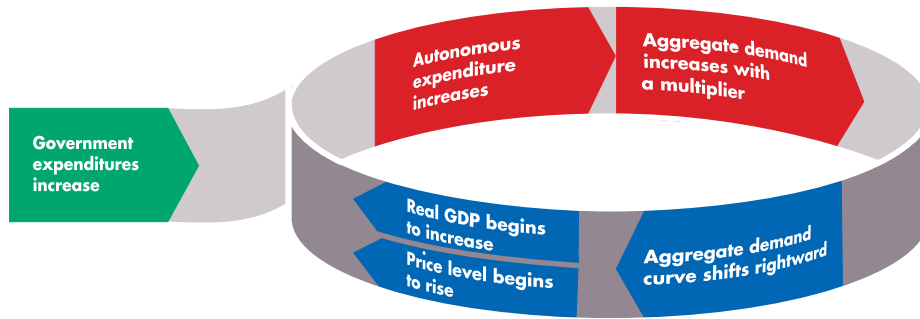
Second, with a given quantity of nominal money, the rising price level decreases the quantity of real money. In Figure 28.3(b), the money supply curve shifts leftward to MS_1 . The decrease in the quantity of real money raises the interest rate further to 7 per cent a year. In Figure 28.3(c), the higher interest rate decreases interest-sensitive expenditure to £50 billion. Because this decrease in spending plans is induced by rise in the price level, it decreases the quantity of real GDP

demand and is shown as a movement along the aggregate demand curve AD_2 in Figure 28.3(c).

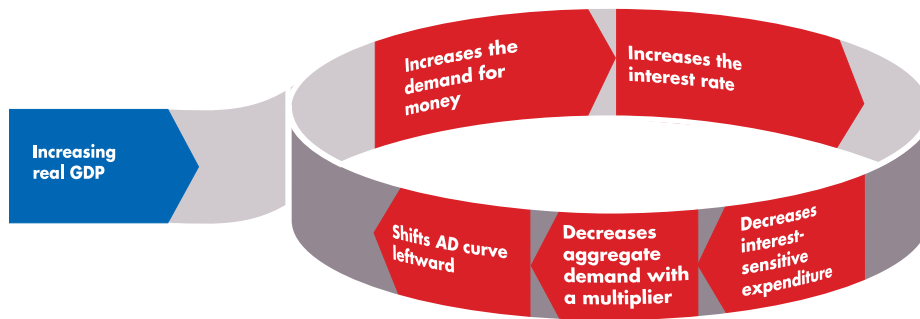
During this second round process, real GDP is increasing and the price level is rising in a gradual movement up along the short-run aggregate supply curve as indicated by the arrows. In the new equilibrium, real GDP is £1,100 billion, the price level is 115, the interest rate is 7 per cent a year, and interest-sensitive expenditure is £50 billion.

Figure 28.4

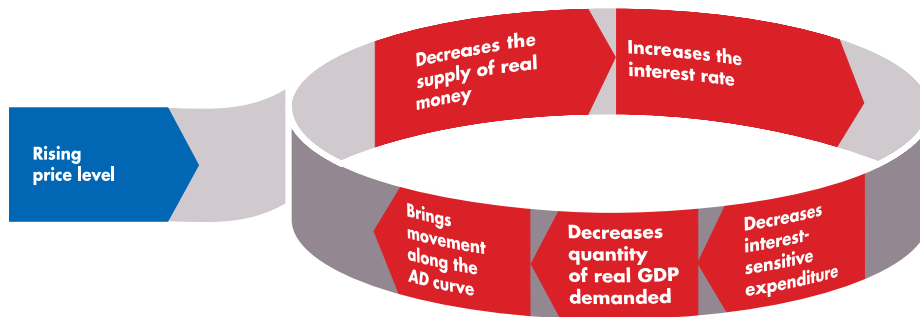
How the Economy Adjusts to an Expansionary Fiscal Policy



(a) First round effect of expansionary fiscal policy



(b) Second round real GDP effect



(c) Second round price level effect

Just as the initial equilibrium in Figure 28.1 was consistent, so the new equilibrium is consistent. The $AS-AD$ equilibrium in Figure 28.3(a), the money market equilibrium in Figure 28.3(b) and interest-sensitive expenditure in Figure 28.3(c) are consistent with each

other. And there is no other equilibrium.

Figure 28.4(a) summarizes the first round of an expansionary fiscal policy action. Figure 28.4(b) summarizes the two parts of the second round adjustments as the economy responds.

Other Fiscal Policies

A change in government expenditures is only one possible fiscal policy action. Others are a change in transfer payments, such as an increase in unemployment benefits, and a change in taxes. All fiscal policy actions work by changing expenditure. But the magnitude of the initial change in expenditure differs for different fiscal actions. For example, changes in taxes and transfer payments change expenditure by smaller amounts than does a change in government expenditures. But fiscal policy actions that change autonomous expenditure by a given amount and in a given direction have similar effects on real GDP, the price level and the interest rate regardless of the initial fiscal policy action. Let's look more closely at the effect of the rise in the interest rate.

Crowding Out and Crowding In

Because an expansionary fiscal policy increases the interest rate, it decreases all the interest-sensitive components of aggregate expenditure. One of these components is investment and the decrease in investment that results from an expansionary fiscal action is called **crowding out**.

Crowding out may be partial or complete. Partial crowding out occurs when the decrease in investment is less than the increase in government expenditures. This is the normal case – and the case we've just seen.

Complete crowding out occurs if the decrease in investment equals the initial increase in government expenditures. For complete crowding out to occur, a small change in the demand for real money must lead to a large change in the interest rate, and the change in the interest rate must lead to a large change in investment.

But another potential influence of government expenditures on investment works in the opposite direction to the crowding-out effect and is called “crowding in”. **Crowding in** is the tendency for expansionary fiscal policy to *increase* investment. This effect works in three ways.

First, in a recession, an expansionary fiscal policy might create expectations of a more speedy recovery and bring an increase in expected profits. Higher expected profits might increase investment despite a higher interest rate.

Second, government expenditures might be productive and lead to more profitable business opportunities. For example, a new motorway might cut the cost of transporting a farmer's produce to a market and induce the farmer to invest in a new fleet of trucks.

Third, if an expansionary fiscal policy takes the form of a cut in taxes on business profits, firms' after-tax profits increase and firms might increase investment.

The Exchange Rate and International Crowding Out

We've seen that an expansionary fiscal policy leads to higher interest rates. But a change in interest rates also affects the exchange rate. Higher interest rates make the pound rise in value against other currencies. With interest rates higher in the United Kingdom than in the rest of the world, funds flow into the United Kingdom and people around the world demand more pounds sterling. As the pound rises in value, foreigners find UK-produced goods and services more expensive and UK residents find imports less expensive. Exports decrease and imports increase – net exports decrease. The tendency for an expansionary fiscal policy to decrease net exports is called **international crowding out**. The decrease in net exports offsets, to some degree, the initial increase in aggregate expenditure brought about by an expansionary fiscal policy.

Review Quiz

- 1 Describe macroeconomic equilibrium. What conditions are met in such an equilibrium? What are the links between aggregate demand, the money market and investment?
- 2 What is an expansionary fiscal policy and what are its first round effects? What is happening at the end of the first round?
- 3 What are the second round effects of an expansionary fiscal policy action? Describe the forces at work and the changes that occur in the interest rate, investment, real GDP and the price level.
- 4 What is crowding out? How does crowding out influence the outcome of a fiscal policy action?
- 5 What is crowding in? How does crowding in influence the outcome of a fiscal policy action?
- 6 How does an expansionary fiscal policy affect the exchange rate? What happens to imports and exports?

You've seen how the money market and the goods market interact when the government changes its fiscal policy. Next we'll study these same interactions when the Bank of England changes its monetary policy.

Monetary Policy in the Short Run

Figure 28.5 describes the economy initially. The quantity of money is £660 billion, the interest rate is 5 per cent a year, interest-sensitive expenditure is £100 billion, real GDP is £1,000 billion and the price level is 110. The Bank of England now increases the quantity of money to £1,155 billion. With a price level of 110, the quantity of real money increases to £1,050 billion.

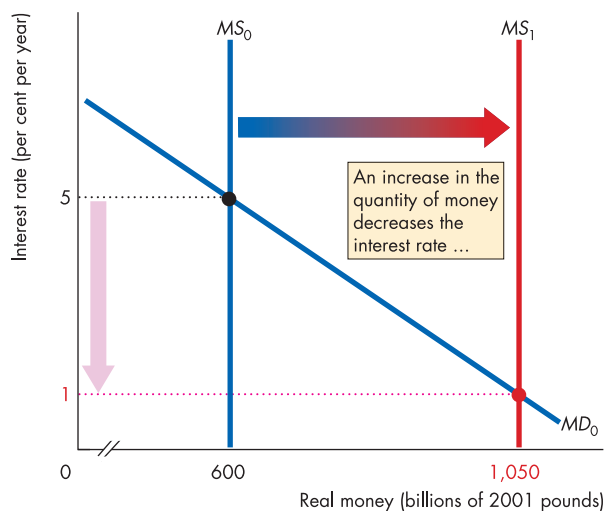
First Round Effects

Figure 28.5(a) shows the immediate effect. The real money supply curve shifts rightward from MS_0 to MS_1 , and the interest rate falls from 5 per cent to 1 per cent a year. The lower interest rate increases interest-sensitive expenditure to £200 billion in part (b). The increase in interest-sensitive expenditure sets off a multiplier process and increases aggregate demand. The aggregate demand curve shifts rightward from AD_0 to

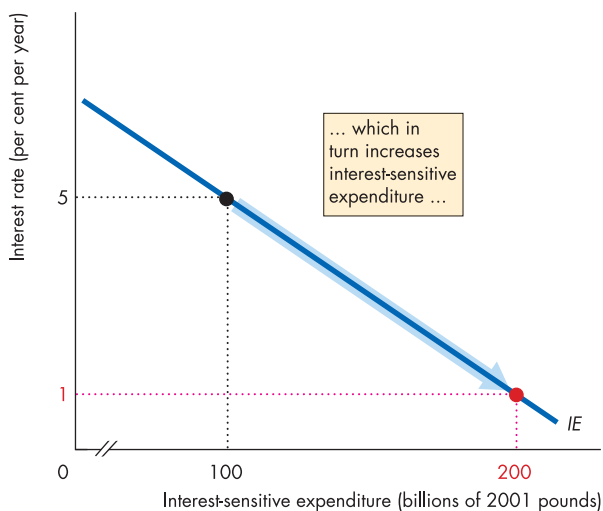
Figure 28.5



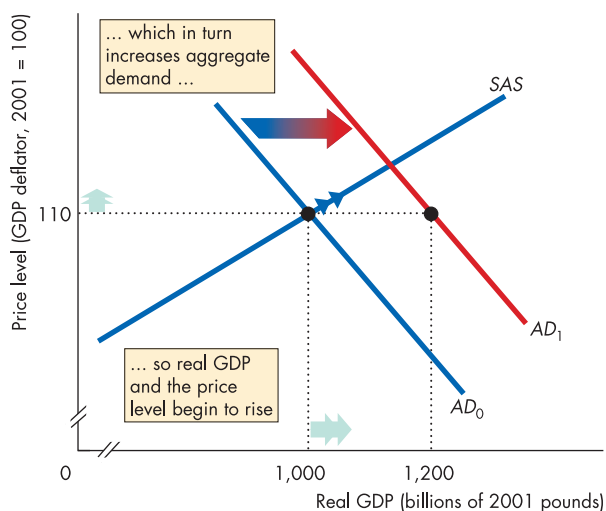
First Round Effects of an Expansionary Monetary Policy



(a) Change in quantity of money



(b) Change in expenditure



(c) Change in aggregate demand

Initially, the demand curve for real money is MD_0 , the supply curve of real money is MS_0 , and the interest rate is 5 per cent a year in part (a). With an interest rate of 5 per cent a year, interest-sensitive expenditure is £100 billion on the IE curve in part (b). The aggregate demand curve is AD_0 in part (c). Equilibrium real GDP is £1,000 billion and the price level is 110.

An increase in the quantity of money shifts the supply of real money curve rightward to MS_1 in part (a). The increased supply of money lowers the interest rate to 1 per cent a year and interest-sensitive expenditure increases to £200 billion in part (b). This increase in expenditure increases aggregate demand to AD_1 in part (c). Real GDP begins to increase and the price level begins to rise.

AD_1 in part (c). As aggregate demand increases, real GDP and the price level begin to increase along the SAS curve towards a new macroeconomic equilibrium.

These are the first round effects of an expansionary monetary policy. An increase in the quantity of money decreases the interest rate and increases aggregate demand. Real GDP and the price level begin to increase.

Let's now look at the second round effects.

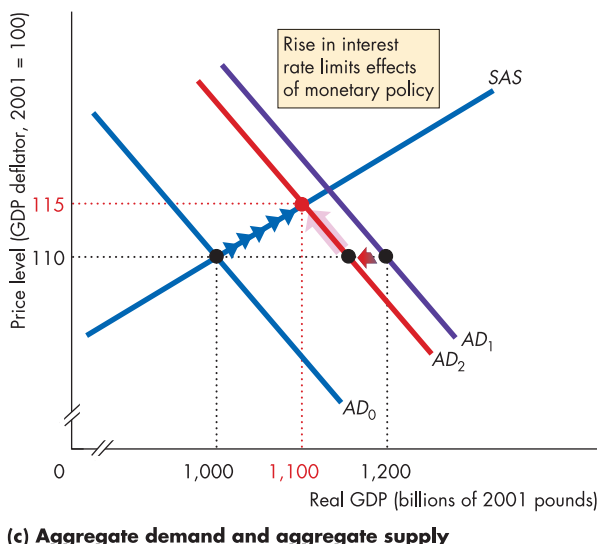
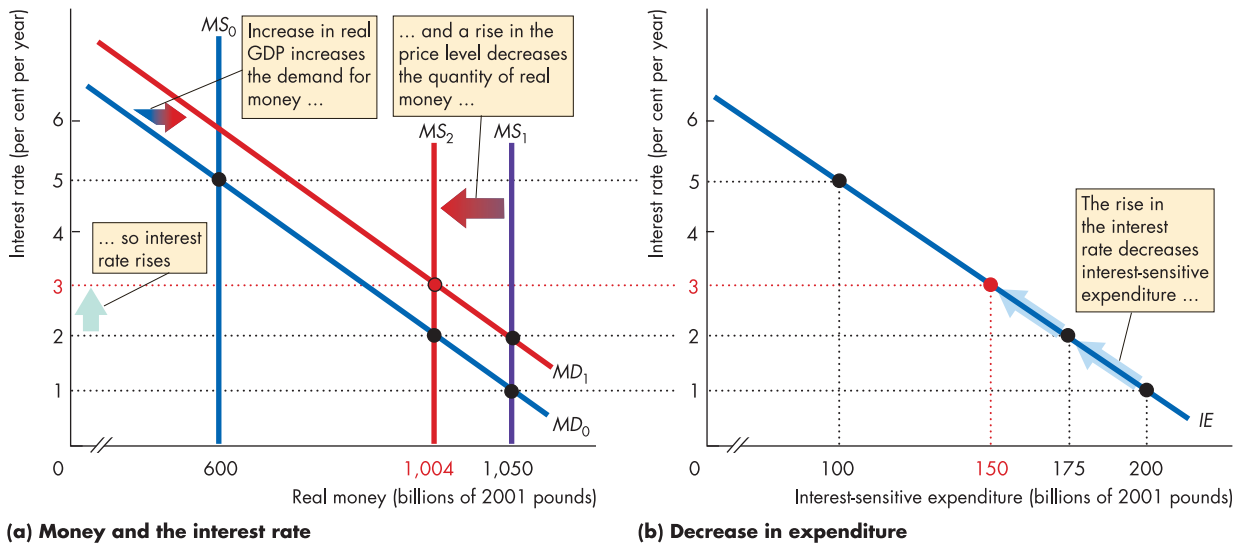
Second Round Effects

The increasing real GDP and rising price level set off the second round, which Figure 28.6(b) illustrates. And as in the case of fiscal policy, it is best to break the second round into two parts: the consequence of increasing real GDP and the consequence of the rising price level.

The increasing real GDP increases the demand for money from MD_0 to MD_1 in Figure 28.6(a). The

Figure 28.6

Second Round Effects of an Expansionary Monetary Policy



At the start of the second round, the demand curve for money is still MD_0 in part (a), the supply curve of real money is MS_1 , and the interest rate is 1 per cent a year. With an interest rate of 1 per cent a year, interest-sensitive expenditure is £200 billion on the curve IE in part (b). With the increased quantity of money and expenditure, the aggregate demand curve is AD_1 in part (c). Real GDP is increasing and the price level is rising.

The increasing real GDP increases the demand for money and the demand for money curve shifts rightward to MD_1 . The higher interest rate decreases interest-sensitive expenditure, which decreases aggregate demand to AD_2 . The rising price level brings a movement along the new AD curve. It does so because it decreases the supply of real money to MS_2 , which in turn raises the interest rate further and decreases expenditure. The new equilibrium occurs when real GDP has increased to £1,100 billion and the price level has risen to 115.

increased demand for money raises the interest rate to 2 per cent a year. The higher interest rate brings a decrease in interest-sensitive expenditure from £200 billion to £175 billion in Figure 28.6(b). And the lower level of expenditure decreases aggregate demand and shifts the aggregate demand curve leftward to AD_2 in Figure 28.6(c).

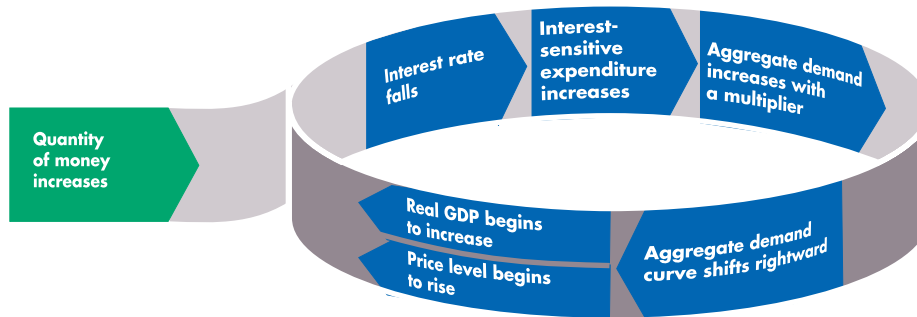
The rising price level brings a movement along the new aggregate demand curve in Figure 28.6(c). This

movement occurs because the rising price level decreases the real money supply. As the price level rises, the real money supply decreases to £1,004 billion and the money supply curve shifts leftward to MS_2 in part (a). The interest rate rises further to 3 per cent a year. And interest-sensitive expenditure decreases to £150 billion in part (b).

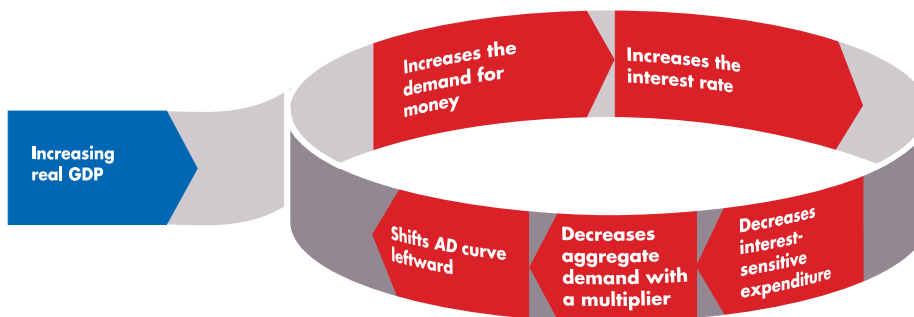
In the new short-run equilibrium, real GDP has increased to £1,100 billion, and the price level has risen

Figure 28.7

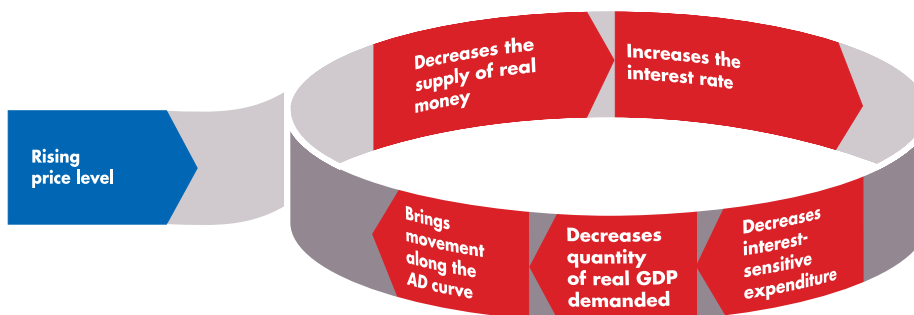
How the Economy Adjusts to an Expansionary Monetary Policy



(a) First round effect of expansionary monetary policy



(b) Second round real GDP effect



(c) Second round price level effect

to 115, where the aggregate demand curve AD_2 intersects the short-run aggregate supply curve SAS .

The demand for money curve is MD_1 , the money supply curve is MS_2 , and the interest rate is 3 per cent a year in part (a). With an interest rate of 3 per cent a year, interest-sensitive expenditure is \$150 billion in part (b).

The new equilibrium is the only consistent one and is like that of Figure 28.1. Figure 28.7 summarizes the adjustments that occur to bring the economy to this new equilibrium.

Money and the Exchange Rate

An increase in the quantity of money lowers the interest rate. If the interest rate falls in the United Kingdom but does not fall in the United States, Japan and Asia, international investors buy the now higher-yielding foreign assets and sell the relatively lower-yielding UK assets. As they make these transactions, they sell pounds. So the pound depreciates against other currencies. (This mechanism is explained in greater detail in Chapter 34, pp. 781–784.)

With a cheaper pound, foreigners face lower prices for UK-produced goods and services and people and firms in the United Kingdom face higher prices for foreign-produced goods and services. UK exports increase and UK imports decrease. UK net exports increase, and real GDP and the price level in the United Kingdom increase further.

Review Quiz

- 1 What are the first round effects of an expansionary monetary policy? What happens to the interest rate, investment and other components of interest-sensitive expenditure, aggregate demand, the demand for money, real GDP and the price level in the first round?
- 2 What are the second round effects of an expansionary monetary policy? What happens to the interest rate, investment and other components of interest-sensitive expenditure, aggregate demand, the demand for money, real GDP and the price level in the second round?
- 3 How does an expansionary monetary policy influence the exchange rate, imports and exports?

Let's now see which policy is more effective.

Relative Effectiveness of Policies

We've seen that aggregate demand and real GDP are influenced by both fiscal and monetary policy. But which policy is the more potent? This question was once at the centre of a controversy among macro-economists. Later in this section we'll look at that controversy and see how it was settled. But we begin by discovering what determines the effectiveness of fiscal policy.

Effectiveness of Fiscal Policy

The effectiveness of fiscal policy is measured by the magnitude of the increase in aggregate demand that results from a given increase in government expenditures (or decrease in taxes). The effectiveness of fiscal policy depends on the strength of the crowding-out effect. Fiscal policy is most powerful if no crowding out occurs. Fiscal policy is impotent if there is complete crowding out. And the strength of the crowding-out effect depends on two things:

- 1 The responsiveness of expenditure to the interest rate
- 2 The responsiveness of the quantity of money demanded to the interest rate

If expenditure is not very responsive to a change in the interest rate, the crowding-out effect is small. But if expenditure is highly responsive to a change in the interest rate, the crowding-out effect is large. Other things remaining the same, the smaller the responsiveness of expenditure to the interest rate, the smaller is the crowding-out effect and the bigger is the change in aggregate demand. So the less responsive expenditure is to the interest rate, the more effective is fiscal policy.

The responsiveness of the quantity of money demanded to the interest rate also affects the size of the crowding-out effect. An increase in real GDP increases the demand for money and with no change in the supply of money, the interest rate rises. But the extent to which the interest rate rises depends on the responsiveness of the quantity of money demanded to the interest rate. Other things remaining the same, the greater the responsiveness of the quantity of money demanded to the interest rate, the smaller is the rise in the interest rate, the smaller is the crowding-out effect and the bigger is the change in aggregate demand. So the more responsive the quantity of money demanded is to the interest rate, the more effective is fiscal policy.

Effectiveness of Monetary Policy

The effectiveness of monetary policy is measured by the magnitude of the increase in aggregate demand that results from a given increase in the money supply. The effectiveness of monetary policy depends on the same two factors that influence the effectiveness of fiscal policy:

- 1 The responsiveness of the quantity of money demanded to the interest rate
- 2 The responsiveness of expenditure to the interest rate

The starting point for monetary policy is a change in the quantity of money that changes the interest rate. A given change in the quantity of money might bring a small change or a large change in the interest rate. Other things remaining the same, the larger the initial change in the interest rate, the more effective is monetary policy. The initial change in the interest rate will be greater, the less responsive is the quantity of money demanded to the interest rate.

But effectiveness of monetary policy also depends on how much expenditure changes. If expenditure is not very responsive to a change in the interest rate, monetary actions do not have much effect on expenditure. But if expenditure is highly responsive to a change in the interest rate, monetary actions have a large effect on aggregate expenditure. The greater the responsiveness of expenditure to the interest rate, the more effective is monetary policy.

The effectiveness of fiscal policy and monetary policy that you've just studied were once controversial. During the 1950s and 1960s, this issue lay at the heart of what was called the Keynesian–monetarist controversy. Let's look at the dispute and see how it was resolved.

The Keynesian–Monetarist Controversy

The Keynesian–monetarist controversy was an ongoing dispute in macroeconomics between two broad groups of economists. A **Keynesian** macroeconomist believes that left alone, the economy would rarely operate at full employment and that to achieve and maintain full employment, active help from fiscal policy and monetary policy is required. Keynesian views about the functioning of the economy are based on the theories of John Maynard Keynes, published in Keynes' *The General Theory of Employment, Interest and Money*. Traditionally, Keynesians assigned a low degree of

importance to monetary policy and a high degree of importance to fiscal policy. Modern Keynesians assign a high degree of importance to both types of policy. A **monetarist** is a macroeconomist who believes that most macroeconomic fluctuations are caused by fluctuations in the quantity of money and that the economy is inherently stable and requires no active government intervention. Monetarist views about the functioning of the economy are based on theories most forcefully set forth by Milton Friedman. Traditionally, monetarists assigned a low degree of importance to fiscal policy. But modern monetarists, like modern Keynesians, assign a high degree of importance to both types of policy.

The nature of the Keynesian–monetarist debate has changed over the years. During the 1950s and 1960s, it was a debate about the relative effectiveness of fiscal policy and monetary policy in changing aggregate demand. We can see the essence of that debate by making three points of view distinct:

- ◆ Extreme Keynesianism
- ◆ Extreme monetarism
- ◆ Intermediate position

Extreme Keynesianism

The extreme Keynesian hypothesis is that a change in the quantity of money has no effect on aggregate demand and that a change in government expenditures on goods and services or taxes has a large effect on aggregate demand. The two circumstances in which a change in the quantity of money has no effect on aggregate demand are:

- 1 Expenditure demand is completely insensitive to the interest rate.
- 2 The demand for real money is highly sensitive to the interest rate.

If expenditure is completely insensitive to the interest rate (if the *IE* curve is vertical), a change in the quantity of money changes interest rates, but those changes do not affect aggregate planned expenditure. Monetary policy is impotent.

If the demand for real money is highly sensitive to the interest rate (if the *MD* curve is horizontal), people are willing to hold any amount of money at a given interest rate – a situation called a *liquidity trap*. With a liquidity trap, a change in the quantity of money affects only the amount of money held. It does not affect interest rates. With an unchanged interest rate, expenditure remains constant. Monetary policy is impotent. Some people

claim (incorrectly) that Japan has been in a liquidity trap since the late 1990s.

Extreme Monetarism

The extreme monetarist hypothesis is that a change in government expenditures on goods and services or taxes has no effect on aggregate demand and that a change in the quantity of money has a large effect on aggregate demand. Two circumstances give rise to these predictions:

- 1 Expenditure is highly sensitive to the interest rate.
- 2 The demand for real money is completely insensitive to the interest rate.

If an increase in government expenditures on goods and services induces an increase in interest rates that is sufficiently large to reduce expenditure by the same amount as the initial increase in government expenditures, then fiscal policy has no effect on aggregate demand. This outcome is complete crowding out. For this result to occur, either the demand for real money must be insensitive to the interest rate – a fixed amount of money is held regardless of the interest rate – or expenditure must be highly sensitive to the interest rate – any amount of expenditure will be undertaken at a given interest rate.

The Intermediate Position

The intermediate position is that both fiscal policy and monetary policy affect aggregate demand. Crowding out is not complete, so fiscal policy does have an effect. There is no liquidity trap and expenditure responds to the interest rate, so monetary policy does indeed affect aggregate demand. This intermediate position is the one that now appears to be correct and is the one that we've spent most of this chapter exploring. Let's see how economists came to this conclusion.

Sorting Out the Competing Claims

The dispute between monetarists, Keynesians and those taking an intermediate position was essentially a disagreement about the magnitudes of two economic parameters:

- 1 The responsiveness of expenditure to the interest rate
- 2 The responsiveness of the demand for real money to the interest rate

If expenditure is highly sensitive to the interest rate or the demand for real money is barely sensitive to the interest rate, then monetary policy is powerful and fiscal policy relatively ineffective. In this case, the world looks similar to the claims of extreme monetarists. If expenditure is very insensitive to the interest rate or the demand for real money is highly sensitive, then fiscal policy is powerful and monetary policy is relatively ineffective. In this case, the world looks similar to the claims of the extreme Keynesians.

By using statistical methods to study the demand for real money and expenditure and data from a wide variety of historical and national experiences, economists were able to settle this dispute. Neither extreme position is supported by the evidence. There is no liquidity trap, not even in Japan. Expenditure *is* interest sensitive. Neither the demand for money curve nor interest-sensitive expenditure curve is vertical or horizontal, so the extreme Keynesian and extreme monetarist hypotheses are rejected.

Interest Rate and Exchange Rate Effectiveness

Although fiscal policy and monetary policy are alternative ways of changing aggregate demand, they have opposing effects on the interest rate and the exchange rate. A fiscal policy action that increases aggregate demand raises the interest rate and increases the exchange rate. A monetary policy action that increases aggregate demand lowers the interest rate and decreases the exchange rate. Because of these opposing effects on interest rates and the exchange rate, if the two policies are combined to increase aggregate demand, their separate effects on the interest rate and the exchange rate can be minimized.

Review Quiz

- 1 What two macroeconomic parameters influence the relative effectiveness of fiscal policy and monetary policy?
- 2 Under what circumstances is the Keynesian view correct and under what circumstances is the monetarist view correct?
- 3 How can fiscal policy and monetary policy be combined to increase aggregate demand yet at the same time keep the interest rate constant?

We're now going to look at expansionary fiscal and monetary policy at full employment.

Policy Actions at Full Employment

An expansionary fiscal policy or monetary policy can bring the economy to full employment. But it is often difficult to determine whether the economy is below full employment. So an expansionary fiscal policy or monetary policy might be undertaken when the economy is at full employment. What happens then? Let's answer this question starting with an expansionary fiscal policy.

Expansionary Fiscal Policy at Full Employment

Suppose the economy is at full employment and the government increases expenditure. All the effects that we worked out earlier in this chapter occur. Except that these effects determine only a *short-run equilibrium*. That is, both the first round and second round effects of policy occur in the short run. There is a third round, which is the long-run adjustment.

Starting out at full employment, an expansionary fiscal policy will create an above full-employment equilibrium in which there is an *inflationary gap*. The money wage rate begins to rise, short-run aggregate supply decreases, and a long-run adjustment occurs in which real GDP decreases to potential GDP and the price level rises.

Figure 28.8 illustrates the combined first and second round short-run effects and the third round long-run adjustment.

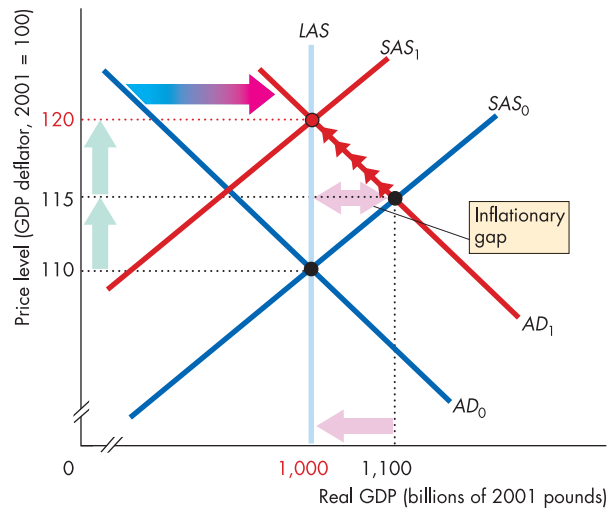
In Figure 28.8, potential GDP is £1,000 billion. Real GDP equals potential GDP on aggregate demand curve AD_0 and short-run aggregate supply curve SAS_0 . An expansionary fiscal policy action increases aggregate demand. The combined first round and second round effect increases aggregate demand to AD_1 . Real GDP increases to £1,100 billion and the price level rises to 115. There is an inflationary gap of £100 billion.

With the economy above full-employment, a shortage of labour puts upward pressure on the money wage rate, which now begins to rise. And a third round of adjustment begins. The rising money wage rate decreases short-run aggregate supply and the SAS curve starts moving leftward towards SAS_1 .

As the short-run aggregate supply decreases, real GDP decreases and the price level rises. This process continues until the inflationary gap has been eliminated and the economy has returned to full employment. At

Figure 28.8

Fiscal Policy at Full Employment



The long-run aggregate supply curve is LAS and initially the aggregate demand curve is AD_0 and the short-run aggregate supply curve is SAS_0 . Real GDP is £1,000 billion and the price level is 110. Changes in fiscal policy and monetary policy shift the aggregate demand curve to AD_1 . At the new short-run equilibrium, real GDP is £1,100 billion and the price level is 115. Because real GDP exceeds potential GDP, the money wage rate begins to rise and the short-run aggregate supply curve begins to shift leftward to SAS_1 . At the new long-run equilibrium, the price level is 120 and real GDP is back at its original level.

long-run equilibrium, real GDP is £1,000 billion, which is potential GDP, and a price level of 120.

Crowding Out at Full Employment

You've just seen that when government expenditures increase at full employment, the long-run change in real GDP is zero. The entire effect of the increase in aggregate demand is to increase the price level. This outcome implies that at full employment, an increase in government expenditures *completely crowds out investment or creates an international (net exports) deficit*, or results in a combination of the two.

The easiest way to see why is to recall that aggregate expenditure, which equals consumption expenditure, C , plus investment, I , plus government expenditures, G , plus net exports, NX , equals real GDP. That is:

$$Y = C + I + G + NX$$

Comparing the initial situation with the outcome, real GDP has not changed. So aggregate expenditure, $C + I + G + NX$, is constant between the two situations.

But government expenditures have increased, so the sum of consumption expenditure, investment, and net exports must have decreased. If net exports don't change, consumption expenditure plus investment decreases by the full amount of the increase in government expenditures. If consumption expenditure and investment don't change, net exports decrease by an amount equal to the increase in government expenditures. A decrease in net exports is an increase in our international deficit.

You've now seen that the effects of expansionary fiscal policy are extremely sensitive to the state of the economy when the policy action is taken. At less than full employment, an expansionary fiscal policy can move the economy towards full employment. At full employment, an expansionary fiscal policy raises the price level, crowds out private expenditure, and creates an international deficit.

You've now seen that the effects of expansionary fiscal policy are extremely sensitive to the state of the economy when the policy action is taken. At less than full employment, an expansionary fiscal policy can move the economy towards full employment. At full employment, an expansionary fiscal policy raises the price level, crowds out investment and creates an international deficit.

Expansionary Monetary Policy at Full Employment

Now suppose the economy is at full employment and the Bank of England increases the quantity of money. Again, all the effects that we worked out earlier in this chapter occur. But again, these effects determine only a *short-run equilibrium*. That is, the first round and second round effects of monetary policy both occur in the short run. And again, there is a third round, which is the long-run adjustment.

Starting out at full employment, an expansionary monetary policy will create an above full-employment equilibrium in which there is an *inflationary gap*. The money wage rate begins to rise, short-run aggregate supply decreases and a long-run adjustment occurs in which real GDP decreases to potential GDP and the price level rises.

Figure 28.8, which illustrates the effects of an expansionary fiscal policy at full employment, also illustrates

the effects of an expansionary monetary policy at full employment.

In the short run, an expansionary monetary policy increases real GDP and the price level. But in the long run, it increases only the price level and leaves real GDP unchanged at potential GDP.

Long-run Neutrality

In the long run, a change in the quantity of money changes only the price level and leaves real GDP unchanged. The independence of real GDP from the quantity of money is an example of the long-run neutrality of money.

But **long-run neutrality** applies not only to real GDP but also to all real variables. The so-called long-run neutrality proposition is that in the long run, a change in the quantity of money changes the price level and leaves all real variables unchanged.

You can see this outcome in the case of real GDP in Figure 28.8. Because a change in the quantity of money leaves real GDP unchanged, it also leaves consumption expenditure unchanged. With no change in real GDP, the demand for money does not change. The price level rises by the same percentage as the increase in the quantity of money, so the supply of real money does not change. With no change in the demand for money and no change in the supply of real money, the interest rate does not change. And with no change in the interest rate, expenditure remains the same. Finally, with no change in real GDP, consumption expenditure, investment, government expenditures and net exports are unchanged.

Review Quiz

- 1 Contrast the short-run effects of an expansionary fiscal policy on real GDP and the price level with its long-run effects when the policy action occurs at full employment.
- 2 Contrast the short-run effects of an expansionary monetary policy on real GDP and the price level with its long-run effects when the policy action occurs at full employment.
- 3 Explain crowding out at full employment.
- 4 Explain the long-run neutrality of money.

You've seen how fiscal policy and monetary policy interact. Do they need to be coordinated and if uncoordinated, do they come into conflict?

Policy Coordination and Conflict

So far, we've studied fiscal policy and monetary policy in isolation from each other. We are now going to consider what happens if the two branches of policy are coordinated and if they come into conflict.

Policy coordination occurs when the government and central bank work together to achieve a common set of goals. **Policy conflict** occurs when the government and the central bank pursue different goals and the actions of one make it harder (perhaps impossible) for the other to achieve its goals.

Policy Coordination

The basis for policy coordination is the fact that either fiscal policy or monetary policy can be used to increase aggregate demand. Starting from a position of *unemployment equilibrium*, an increase in aggregate demand increases real GDP and decreases unemployment. If the size of the policy action is well judged, it can restore full employment. Similarly, starting from a position of *above full-employment equilibrium*, a decrease in aggregate demand decreases real GDP and can, if the size of the policy action is well judged, eliminate an *inflationary gap*. Because either a fiscal policy or a monetary policy action can achieve these objectives, the two policies can (in principle) be combined to also achieve the same outcome.

If either or both policies can restore full employment and eliminate inflation, why does it matter which policy is used? It matters because the two policies have different side effects – different effects on other variables about which people care. These side effects of policy work through two key variables and have:

- ◆ Interest rate effects
- ◆ Exchange rate effects

Interest Rate Effects

An expansionary fiscal policy *raises* the interest rate while an expansionary monetary policy *lowers* the interest rate. When the interest rate changes, investment changes, so an expansionary fiscal policy decreases investment (crowding out) while an expansionary monetary policy increases investment. So if an expansionary fiscal policy increases aggregate demand, consumption expenditure increases and investment decreases. But if an expansionary monetary policy increases aggregate

demand, consumption expenditure and investment increase.

By coordinating fiscal policy and monetary policy and increasing aggregate demand with an appropriate combination of the two, it is possible to increase real GDP and lower unemployment with either no change in the interest rate or with any desired change in the interest rate. A big dose of fiscal expansion and a small dose of monetary expansion raises the interest rate and decreases investment, while a small dose of fiscal expansion and a big dose of monetary expansion lowers the interest rate and increases investment.

The interest rate affects our long-term growth prospects because the growth rate of potential GDP depends on the amount of investment. The connection between investment, capital and growth is explained in Chapter 23, pp. 515–517.

Exchange Rate Effects

An expansionary fiscal policy raises not only the interest rate but also the exchange rate. In contrast, an expansionary monetary policy *lowers* the exchange rate. When the exchange rate changes, net exports change. An expansionary fiscal policy decreases net exports (international crowding out), while an expansionary monetary policy increases net exports. So if full employment is restored by expansionary policy, net exports decrease with fiscal expansion and increase with monetary expansion.

Policy Conflict

Policy conflicts are not planned. But they can happen. When they arise, it is usually because of a divergence of the political priorities of the government and the objectives of the central bank.

Governments pay a lot of attention to employment and production over a short time horizon. They look for policies that make their re-election chances high. Central banks pay a lot of attention to price level stability and have a long time horizon. They don't have an election to worry about.

So a situation might arise in which the government wants the central bank to pursue an expansionary monetary policy but the central bank wants to keep its foot on the monetary brake. The government says that a lower interest rate and exchange rate are essential to boost investment and exports. The central bank says that the problem is with fiscal policy. Spending is too high and revenues too low. With fiscal policy too

expansionary, the interest rate and the exchange rate are high and they cannot be lowered permanently by monetary policy. To lower the interest rate and give investment and exports a boost, fiscal policy must become contractionary. Only then can an expansionary monetary policy be pursued.

A further potential conflict between a government and its central bank concerns the financing of the government deficit. A government deficit can be financed either by borrowing from the general public or by borrowing from the central bank. If the government borrows from the general public, it must pay interest on its debt. If it borrows from the central bank, it pays interest to the bank. But the government owns the bank, so the interest comes back to the government.

But when the central bank buys government debt, it pays for the debt with a newly created monetary base. The quantity of money increases. And such finance leads to inflation. In many countries, for example in Eastern Europe, Latin America and Africa, government deficits have been financed by the central bank.

In the United Kingdom, government deficits have not been financed by the Bank of England. Indeed, the requirement for the Bank of England to achieve an inflation target along with its independence to pursue that target makes it very unlikely that a United Kingdom government would easily follow the Latin American path.

The “Stability and Growth Pact” of the Eurozone (see Box 28.1) is an attempt to avoid conflict.

Review Quiz

- 1 What are the main things that can be achieved by coordinating fiscal policy and monetary policy?
- 2 What are the main sources of conflict in policy between the central bank and the government?
- 3 Explain what happens if the government pursues an expansionary fiscal policy while the central bank pursues a contractionary monetary policy.
- 4 Explain how inflation can be avoided despite a government building up a large budget deficit.

Reading Between the Lines on pp. 642–643 looks at the interaction of the Bank of England’s monetary policy and the UK government’s fiscal policy in 2004.

Box 28.1

EU Stability and Growth Pact

The potential for conflict between fiscal policy and monetary policy is greater in the Eurozone than in the United Kingdom. The key reason is that in the United Kingdom, the government ultimately controls the central bank while in the Eurozone, the governments of the member states do not control the European Central Bank (ECB). To avoid conflict, membership of the European Monetary Union (EMU) imposes fiscal constraints on individual countries.

In 1997, the European Council resolved by treaty to ensure that the national budgetary policies of EMU countries will support the ECB’s monetary policy of a target inflation rate of less than 2 per cent a year.

The Stability and Growth Pact states that member countries of the Eurozone will aim to have a balanced fiscal budget. Countries that have a budget deficit in excess of 3 per cent of GDP will be fined up to 0.5 per cent of GDP, except if a natural disaster or a severe recession occurs and real GDP falls by more than 2 per cent in a year.

The provisions of the Stability and Growth Pact appear draconian in its measure, but there are good arguments as to why fiscal policy might need to be constrained in the EMU.

For example, if one country conducts an expansionary fiscal policy, aggregate demand in that country will increase and so will the demand for money in both that country and the whole Eurozone. The increase in the demand for money will raise the interest rate, which will lead to an appreciation of the euro exchange rate against the US dollar. Exports from all Eurozone countries will decrease. In addition, the higher interest rate will reduce interest-sensitive expenditure in all Eurozone countries, not only the country with expansionary fiscal policy. So the country that adopts an expansionary fiscal policy will gain at the expense of those that do not.

If the expansionary fiscal policy creates a budget deficit, the increased borrowing to cover the deficit will lead to a higher interest rate in the Eurozone. Countries hurt by the higher interest rate might attempt to pressure the ECB into increasing the quantity of money and lowering the interest rate. The Stability and Growth Pact can interfere with the automatic fiscal policy that occurs as the economy goes into a downturn.

Creating a Stability and Growth Pact is easy. Enforcing it is turning out to be harder. France and Germany, the two largest members of the EMU, are in breach of the Stability and Growth Pact.

Reading Between the Lines

Fiscal and Monetary Policy Conflict

The Economist, 31 July 2004

Boom, bust and hubris

Gordon Brown, Britain's chancellor of the exchequer, has recently developed a worrying tendency to boast about his economic record. It's the longest period of sustained growth in the past 200 years, he says, extolling the "British model" to other countries as an example of how to run an economy properly, with monetary and fiscal policy working together to achieve stability and growth.

But every triumph has a price tag. The success in avoiding recession meant that the economy built up little spare capacity during the slowdown. So this time, unlike in previous recoveries, there is less scope for a bout of rapid growth in which excess supply keeps inflation at bay.

That is why the latest economic figures will worry the Bank of England's monetary

policy committee when it considers its next decision on interest rates. GDP increased by 3.7% in the year to the second quarter. That was not just the fastest growth in almost four years, it was also well above the underlying economic growth rate of around 2.5%.

June figures show . . . monetary and fiscal policy are no longer working together to achieve stability. Instead they are pulling in different directions. Fiscal policy remains highly expansionary, the budget deficit will remain around 3% of GDP this year and the next. That's because, with an election looming in summer 2005, the chancellor has run scared of new tax increases. This shifts the burden of reining in the economy to the Bank of England, which has to raise interest rates more than would otherwise be the case.

© The Economist. Reprinted with permission.

The Essence of the Story

- ◆ Mr. Gordon Brown, the British Minister of Finance, is saying that UK fiscal and monetary policy are working together to achieve stability and growth.
- ◆ The success of avoiding recession means that the UK economy has built up little spare capacity during the slowdown.
- ◆ The UK government fiscal policy has remained expansionary with the government budget expected to remain at 3 per cent of GDP in 2004.
- ◆ An election is expected in 2005, so Mr. Brown is reluctant to raise taxes, which shifts the burden of reining in the economy to the Bank of England.

Economic Analysis

- ◆ The Bank of England's objective is to keep the inflation rate below 2.5 per cent a year.
- ◆ The UK government has embarked on a strong expansionary fiscal policy before the election in 2005.
- ◆ Figure 1 shows the growth rate of real GDP and the government forecast of real GDP growth the last quarter of 2004. The figure also shows the Bank of England's interest rate and the consensus forecast for interest rates for the last quarter of 2004.
- ◆ Expansionary fiscal policy will increase aggregate demand. If the economy is at potential GDP, the increase in aggregate demand will shift the aggregate demand curve in Figure 2 from AD_{03} to AD_{04} .
- ◆ To achieve its inflation target, the Bank of England will be forced to decrease the supply of money and raise the interest rate, which will decrease aggregate demand and shift the aggregate demand curve leftward.
- ◆ The contractionary monetary policy will offset the expansionary fiscal policy. Monetary policy and fiscal policy will be in conflict.
- ◆ The policy conflict will result in complete crowding out and no increase in real GDP – the higher interest rate decreases interest-sensitive expenditure by the same amount as fiscal policy has increased autonomous expenditure.

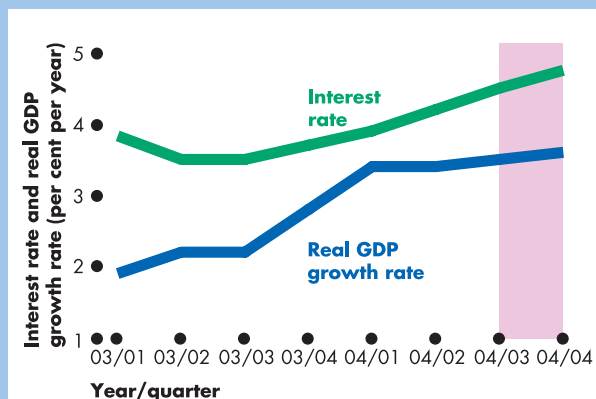


Figure 1 Interest rate and real GDP growth

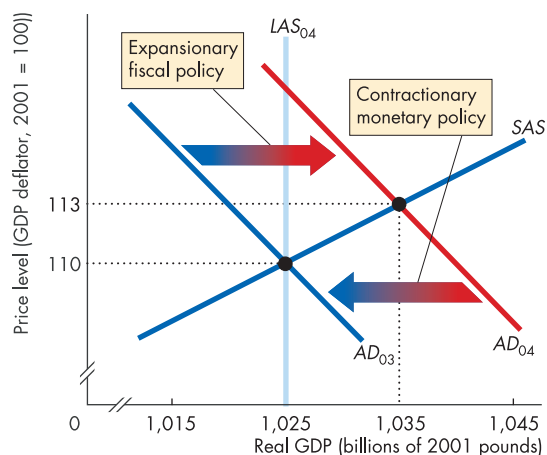


Figure 2 Aggregate supply and aggregate demand in 2004

Summary

Key Points

Macroeconomic Equilibrium

(pp. 626–627)

- ◆ Equilibrium real GDP, the price level and the interest rate are determined simultaneously by equilibrium in the money market and equality of aggregate demand and aggregate supply.

Fiscal Policy in the Short Run

(pp. 628–631)

- ◆ The first round effects of an expansionary fiscal policy are an increase in aggregate demand, increasing real GDP, and a rising price level.
- ◆ The second round effects are an increasing demand for money and a decreasing supply of (real) money that limit the increase in real GDP and the rise in the price level.
- ◆ Interest-sensitive expenditure, which includes investment and net exports, decreases.

Monetary Policy in the Short Run

(pp. 632–635)

- ◆ The first round effects of an expansionary monetary policy are a fall in the interest rate, an increase in aggregate demand, an increasing real GDP and a rising price level.
- ◆ The second round effects are an increasing demand for money and a decreasing supply of (real) money that limit the increase in real GDP and the rise in the price level.
- ◆ Interest-sensitive expenditure, which includes investment and net exports, increases.

Relative Effectiveness of Policies

(pp. 635–637)

- ◆ The relative effectiveness of fiscal and monetary policy depends on the interest-sensitivity of expenditure and the demand for money.
- ◆ The extreme Keynesian position is that only fiscal policy affects aggregate demand. The extreme monetarist position is that only monetary policy affects aggregate demand. Neither extreme is correct.

- ◆ The mix of fiscal and monetary policy influences the composition of aggregate demand.

Policy Actions at Full Employment

(pp. 638–639)

- ◆ An expansionary fiscal policy at full employment increases real GDP and the price level in the short run but increases only the price level in the long run. Complete crowding of investment occurs or the international deficit increases.
- ◆ An expansionary monetary policy at full employment increases real GDP and the price level in the short run but increases only the price level in the long run. Money is neutral – has no real effects – in the long run.

Policy Coordination and Conflict

(pp. 640–641)

- ◆ Policy coordination can make changes in the interest rate and the exchange rate small.
- ◆ Policy conflict can avoid inflation in the face of a government deficit.

Key Figures

Figure 28.1 Equilibrium Real GDP, Price Level, Interest Rate and Expenditure, 627

Figure 28.2 First Round Effects of an Expansionary Fiscal Policy, 628

Figure 28.3 Second Round Effects of an Expansionary Fiscal Policy, 629

Figure 28.5 First Round Effects of an Expansionary Monetary Policy, 632

Figure 28.6 Second Round Effects of an Expansionary Monetary Policy, 633

Figure 28.8 Fiscal Policy at Full Employment, 638

Key Terms

Crowding in, 631
 Crowding out, 631
 International crowding out, 631
 Keynesian, 636
 Long-run neutrality, 639
 Monetarist, 636
 Policy conflict, 640
 Policy coordination, 640

Problems

- *1** In the economy described in Figure 28.1, suppose the government decreases its expenditures on goods and services by £100 billion.
- Work out the first round effects.
 - Explain how real GDP and the interest rate change.
 - Explain the second round effects that take the economy to a new equilibrium.
- 2** In the economy described in Figure 28.1, suppose the government increases its expenditures on goods and services by £25 billion.
- Work out the first round effects.
 - Explain how real GDP and the interest rate change.
 - Explain the second round effects that take the economy to a new equilibrium.
 - Compare the equilibrium in this case with the one described in the chapter on pp. 628–629. In which case does the interest rate change by most? Why?
- *3** In the economy described in Figure 28.1, suppose the Bank of England decreases the money supply by £450 billion.
- Work out the first round effects.
 - Explain how real GDP and the interest rate change.
 - Explain the second round effects that take the economy to a new equilibrium.
- 4** In the economy described in Figure 28.1, suppose the Bank of England increases the supply of real money by £250 billion.
- Work out the first round effects.
 - Explain how real GDP and the interest rate change.
 - Explain the second round effects that take the economy to a new equilibrium.
 - Compare the equilibrium in this case with the one described in the chapter on pp. 632–634. In which case does real GDP change by most? In which case does the interest rate change by most? Why?
- *5** The economies of two countries, Alpha and Beta, are identical in every way except the following: in Alpha, a change in the interest rate of 1 percentage point (e.g. from 5 per cent to 6 per cent) results in a €1 billion change in the quantity of real money demanded. In Beta, a change in the interest rate of 1 percentage point results in a €0.1 billion change in the quantity of real money demanded.
- In which economy does an increase in government expenditures on goods and services have a larger effect on real GDP?
 - In which economy is the crowding-out effect weaker?
 - In which economy does a change in the money supply have a larger effect on equilibrium real GDP?
 - Which economy, if either, is closer to the Keynesian extreme and which is closer to the monetarist extreme?
- 6** The economies of two countries, Gamma and Delta, are identical in every way except the following: in Gamma, a change in the interest rate of 1 percentage point (e.g. from 5 per cent to 6 per cent) results in a €0.1 billion change in interest-sensitive expenditure. In Delta, a change in the interest rate of 1 percentage point results in a €10 billion change in interest-sensitive expenditure.
- In which economy does an increase in government expenditures on goods and services have a larger effect on real GDP?
 - In which economy is the crowding-out effect weaker?
 - In which economy does a change in the money supply have a larger effect on equilibrium real GDP?
 - Which economy, if either, is closer to the Keynesian extreme and which is closer to the monetarist extreme?
- *7** The economy is in a recession and the government wants to increase aggregate demand, stimulate exports and increase investment. It has three policy options: increase government expenditures on goods and services, decrease taxes and increase the supply of money.
- Explain the mechanisms at work under each alternative policy.
 - What is the effect of each policy on the composition of aggregate demand?
 - What are the short-run effects of each policy on real GDP and the price level?
 - Which policy would you recommend that the government adopt? Why?

*Solutions to odd-numbered problems are available on *Parkin Interactive*.

- 8** The economy has an inflationary gap and the government wants to decrease aggregate demand, cut exports and decrease investment. It has three policy options: decrease government expenditures on goods and services, increase taxes and decrease the supply of money.
- Explain the mechanisms at work under each alternative policy.
 - What is the effect of each policy on the composition of aggregate demand?
 - What are the short-run effects of each policy on real GDP and the price level?
 - Which policy would you recommend and why?
- *9** The economy is at full employment, but the government is disappointed with the growth rate of real GDP. It wants to increase real GDP growth by stimulating investment. At the same time, it wants to avoid an increase in the price level.
- Suggest a combination of fiscal and monetary policies that will achieve the government's objective.
 - Which policy would you recommend that the government adopt?
 - Explain the mechanisms at work under your recommended policy.
 - What is the effect of your recommended policy on the composition of aggregate demand?
 - What are the short-run and long-run effects of your recommended policy on real GDP and the price level?
- 10** The economy is at full employment, and the government is worried that the growth rate of real GDP is too high because it is depleting the country's natural resources. The government wants to lower real GDP growth by lowering investment. At the same time it wants to avoid a fall in the price level.
- Suggest a combination of fiscal and monetary policies that will achieve the government's objective.
 - Which policy would you recommend that the government adopt?
 - Explain the mechanisms at work under your recommended policy.
 - What is the effect of your recommended policy on the composition of aggregate demand?
 - What are the short-run and long-run effects of your recommended policy on real GDP and the price level?

Critical Thinking

- 1** Study *Reading Between the Lines* on pp. 642–643 and then answer the following questions:
- What is happening to fiscal policy in the United Kingdom? What is the budget deficit expected to be in 2004 and 2005 as per cent of GDP?
 - What is the objective of the Bank of England's monetary policy?
 - What happened to real GDP growth in the United Kingdom in 2003 and 2004?
 - Has the increase in real GDP been caused by the expansionary fiscal policy alone?
 - What policy has the Bank of England taken in response to increasing growth?
 - What in your opinion is the likely outcome of both the government and Bank of England policies on real GDP and inflation?

Web Exercise

Use the link on *Parkin Interactive* to work the following exercise.

- 1** Visit the website of Office for National Statistics and look at the current economic conditions. On the basis of the current state of the UK economy, and in the light of what you now know about fiscal and monetary policy interaction, what do you predict would happen to real GDP and the price level:
- If the Bank of England conducted an expansionary monetary policy?
 - If the Bank of England conducted a contractionary monetary policy?
 - If the government conducted an expansionary fiscal policy?
 - If the government conducted a contractionary fiscal policy?
 - If the Bank of England conducted an expansionary monetary policy and the government conducted a contractionary fiscal policy?
 - If the Bank of England conducted a contractionary monetary policy and the government conducted an expansionary fiscal policy?

CHAPTER 28 APPENDIX

The *IS-LM* Model of Aggregate Demand

After studying this appendix, you will be able to:

- ◆ Explain the purpose and origin of the *IS-LM* model
- ◆ Define and derive the *IS* curve
- ◆ Define and derive the *LM* curve
- ◆ Define and derive *IS-LM* equilibrium
- ◆ Use the *IS-LM* model to analyze the relative effectiveness of fiscal policy and monetary policy
- ◆ Use the *IS-LM* model to derive the aggregate demand curve

Purpose and Origin of the *IS-LM* Model

This appendix explains a neat way of summarizing what you've learned about aggregate demand. Before we get into the details of the *IS-LM* model, we'll examine its purpose and origin.

Purpose of the *IS-LM* Model

The purpose of the *IS-LM* model is two-fold:

- 1 To provide a tool for analyzing fiscal policy and monetary policy
- 2 To derive the aggregate demand curve

In Chapter 22, you saw the importance of distinguishing between aggregate demand and the quantity of real GDP demanded at a given price level. And you learned why the aggregate demand curve slopes downward and what makes it shift.

In Chapter 24, you learned that each point on the aggregate demand curve corresponds to a point of equilibrium expenditure – a point at which the *AE* curve intersects the 45 degree line (Figure 24.9, p. 542). In deriving the *AD* curve, we noted that there is a different

AE curve for each price level. The *IS-LM* model breaks the source of the shift in the *AE* curve into two parts:

- 1 The effect of the interest rate on spending plans
- 2 The effect of the price level on the interest rate.

In Chapter 25, you saw how fiscal policy influences aggregate demand. Then in Chapters 26 and 27 you saw that spending plans depend on the interest rate. We summarized this effect with the interest-sensitive expenditure curve. You also saw how monetary policy influences the interest rate and spending.

Once money becomes a central part of the story about how aggregate demand is determined, things get a bit complicated. The source of the complication is that everything seems to depend on everything else! Spending plans depend on real GDP and the interest rate. In equilibrium, planned spending equals real GDP but because planned spending depends on the interest rate, we need to know how the interest rate is determined.

You've seen how the demand for money and the supply of money determine the interest rate. But the quantity of real money that people plan to hold depends on real GDP. So to determine the interest rate, that we need to determine real GDP, we need to know real GDP! We seem to be going around in a circle.

The *IS-LM* model cuts through the complexity of combining spending plans and money holding plans and shows us how both real GDP and the interest rate are determined simultaneously by equilibrium expenditure and money market equilibrium.

By using a model that simultaneously determines real GDP and the interest rate, we can see how fiscal policy and monetary policy influence both these variables. We can also see why fiscal policy and monetary policy might come into conflict and need to be coordinated.

Origin of the *IS-LM* Model

The *IS-LM* model was invented by John Hicks, of Oxford University, one of the greatest economists of the twentieth century. The model is a logically coherent clarification of the confusing prose written by John Maynard Keynes in his *General Theory of Employment, Interest and Money*. Hicks cut through the mystery of the *General Theory* and although Keynes never acknowledged that Hicks had correctly interpreted his words, almost every other economist believed that he had done so. Hicks' *IS-LM* model became the core model for macroeconomic policy analysis.

The IS Curve

The **IS curve** shows combinations of real GDP and the interest rate at which aggregate planned expenditure equals real GDP. Figure A28.1 derives the IS curve.

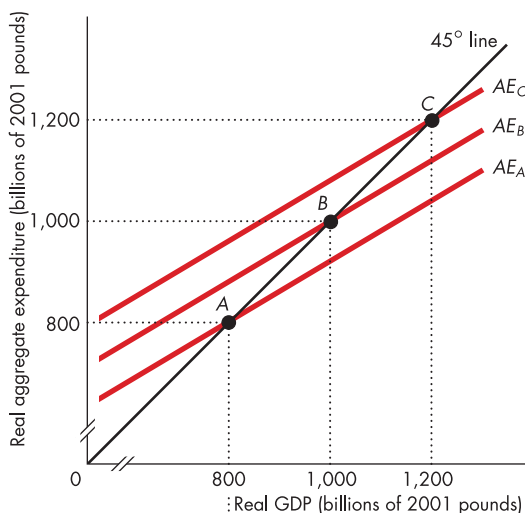
Each row of the table is an aggregate expenditure schedule. Aggregate expenditure depends on the interest rate: as the interest rate decreases aggregate expenditure increases. Part (a) shows an AE curve for each interest rate. When the interest rate is 6 per cent a year (row A), the aggregate expenditure curve is AE_A . The curves AE_B

and AE_C correspond to rows B and C of the table. Each AE curve generates equilibrium expenditure. On AE_A , equilibrium expenditure is £800 billion at point A. On AE_B and AE_C , equilibrium expenditure is at points B and C.

Part (b) shows the IS curve – equilibrium expenditure at each interest rate. Point A on the IS curve corresponds to point A in part (a). It tells us that if the interest rate is 6 per cent a year, the equilibrium expenditure occurs at a real GDP of £800 billion. Points B and C on the IS curve illustrate the equilibrium expenditure at points B and C in part (a).

Figure A28.1

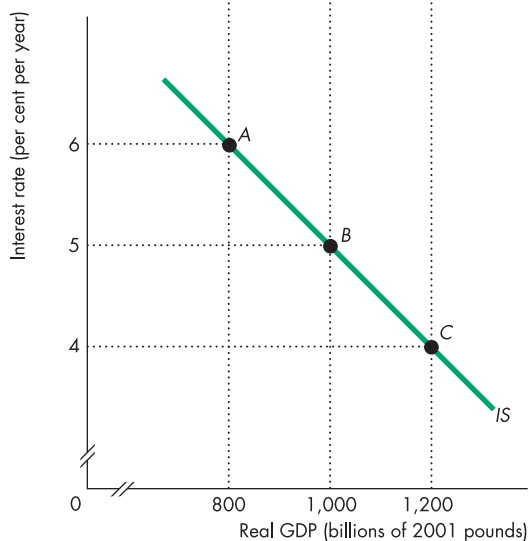
Aggregate Planned Expenditure and the IS Curve



The table shows aggregate planned expenditure that occurs at different combinations of the interest rate and real GDP. Each of rows A, B and C represents an aggregate expenditure schedule, which is plotted as the aggregate expenditure curves AE_A , AE_B and AE_C , respectively, in part (a).

Equilibrium expenditure occurs in part (a), where these AE curves intersect the 45° line and are marked A, B and C. Part (b) shows these same equilibrium positions but highlights the combinations of the interest rate and the real GDP at which they occur. The green squares show equilibrium expenditure. The line connecting these points is the IS curve.

(a) Aggregate expenditure and real GDP



(b) The IS curve

Interest rate (per cent per year)		Autonomous expenditure (billions of 2001 pounds)	Aggregate planned expenditure (billions of 2001 pounds)		
A	6	200	800	950	1,100
B	5	250	850	1,000	1,150
C	4	300	900	1,050	1,200

Induced expenditure		600	750	900
Real GDP (billions of 2001 pounds)		800	1,000	1,200

The LM Curve

The **LM curve** shows the combinations of real GDP and the interest rate at which the quantity of real money demanded equals the quantity of real money supplied. Figure A28.2 derives the LM curve.

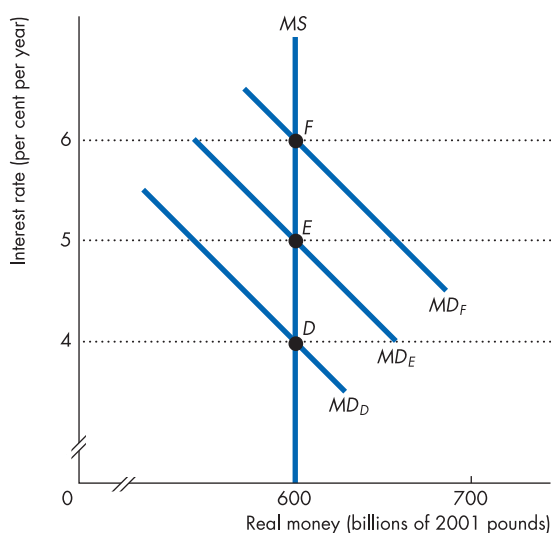
Each column of the table is a demand for money schedule. The demand for money depends on real GDP: as real GDP increases the demand for money increases. Part (a) shows an MD curve for each real GDP. When real GDP is £800 billion (column *D*), the demand for money curve is MD_D . Demand for money curves MD_E and MD_F correspond to columns *E* and *F* of the table.

Each MD curve generates an equilibrium interest rate. On MD_D , money market equilibrium is at point *D*, where the interest rate is 4 per cent a year. On MD_E and MD_F , money market equilibrium is at points *E* and *F*.

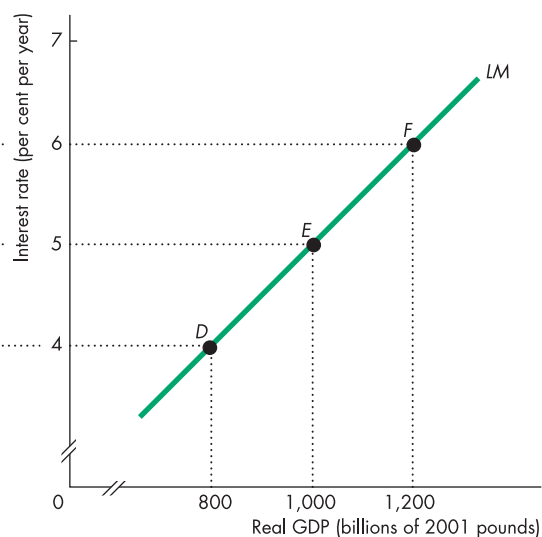
Part (b) shows the LM curve – equilibrium real GDP at each interest rate. Point *D* on the LM curve corresponds to point *D* in part (a). It tells us that if the interest rate is 4 per cent a year, the quantity of money demanded equals the quantity of money supplied at a real GDP of £800 billion. Points *E* and *F* in part (b) on the LM curve illustrate money market equilibrium at points *E* and *F* in part (a).

Figure A28.2

The Money Market and the LM Curve



(a) Money market equilibrium



(b) The LM curve

The table shows the quantity of real money demanded at different combinations of the interest rate and real GDP. Money market equilibrium – equality between the quantity of real money demanded and supplied – is shown by the green squares. Each of the columns *D*, *E* and *F* represents a demand for real money schedule, plotted as the demand for real money curves MD_D , MD_E and MD_F respectively, in part (a). Money market equilibrium occurs at points *D*, *E* and *F*. Part (b) shows these equilibrium points but highlights the combinations of the interest rate and real GDP at which they occur. The line connecting these points is the LM curve.

Interest rate (per cent per year)	Quantity of real money demanded (billions of 2001 pounds)		
6	500	540	600
5	550	600	660
4	600	660	730
Real GDP	800	1,000	1,200
Real money supply (billions of 2001 pounds)	600 <i>D</i>	600 <i>E</i>	600 <i>F</i>

IS–LM Equilibrium

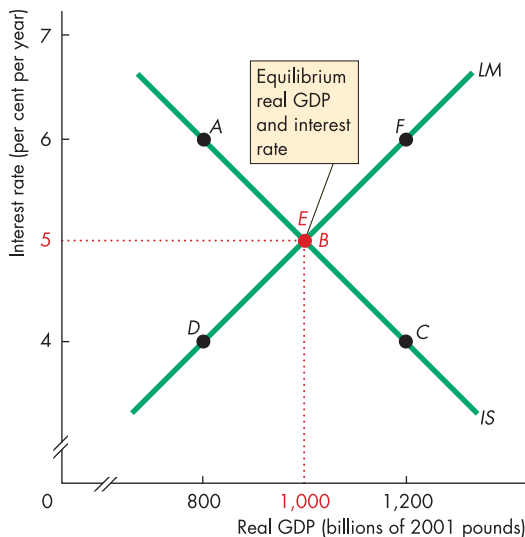
The *IS* curve and the *LM* curve determine the equilibrium interest rate and real GDP at a given price level. Figure A28.3 brings together the *IS* curve and the *LM* curve and shows the *IS*–*LM* equilibrium – at the intersection of the *IS* curve and *LM* curve.

At point *B* on the *IS* curve, aggregate planned expenditure equals real GDP. At point *E* on the *LM* curve, the quantity of real money demanded equals the quantity of real money supplied. At this intersection point, the equilibrium interest rate is 5 per cent a year and real GDP is £1,000 billion.

All other points are either off the *IS* curve or off the *LM* curve. At points off the *IS* curve, aggregate planned expenditure does not equal real GDP. And at points off the *LM* curve are points at which the money market is not in equilibrium.

Figure A28.3

IS–LM Equilibrium



All points on the *IS* curve are points where aggregate planned expenditure equals real GDP. All points on the *LM* curve are points at which the quantity of real money demanded equals the quantity of real money supplied. The intersection of the *IS* curve on the *LM* curve determines the equilibrium interest rate and real GDP – 5 per cent a year and £1,000 billion. At this interest rate and real GDP, there is equilibrium in the goods market and the money market.

IS–LM Policy Analysis

We can use the *IS*–*LM* model to analyse the effects of fiscal policy and monetary policy on real GDP and the interest rate (at a given price level).

Fiscal Policy

A change in government expenditures or autonomous taxes shifts the *IS* curve, but with a given monetary policy, the *LM* curve does not change. If the government conducts an expansionary fiscal policy, the *IS* curve shifts rightward from IS_0 to IS_1 in Figure A28.4(a). The interest rate rises and real GDP increases.

The increase in real GDP is less than the shift in the *IS* curve. The reason is that the rise in the interest rate leads to a decrease in interest-sensitive expenditure, which partially offsets the increase in aggregate expenditure created by the expansionary fiscal policy – what is called partial crowding out.

Monetary Policy

Along the *LM* curve the quantity of money supplied is constant. If the Bank of England changes the quantity of money, the *LM* curve shifts and the interest rate adjusts to restore money market equilibrium. But other changes occur when the Bank of England conducts an expansionary monetary policy and the *IS*–*LM* model shows these changes.

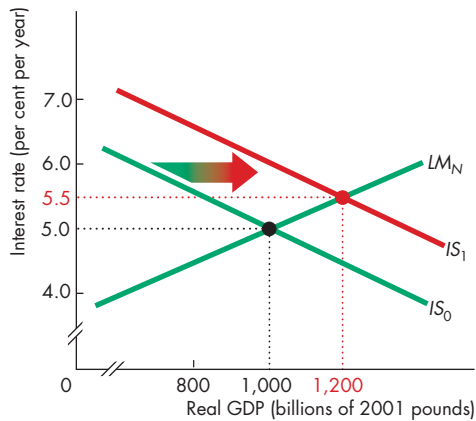
An increase in the quantity of money shifts the *LM* curve rightward and with a given fiscal policy, the *IS* curve does not change. The *LM* curve shifts from LM_0 to LM_1 in Figure 28.4(b). The interest rate falls and real GDP increases. Real GDP increases because the lower interest rate induced by the expansionary monetary policy increases the amount of interest-sensitive expenditure.

Two Extreme Cases

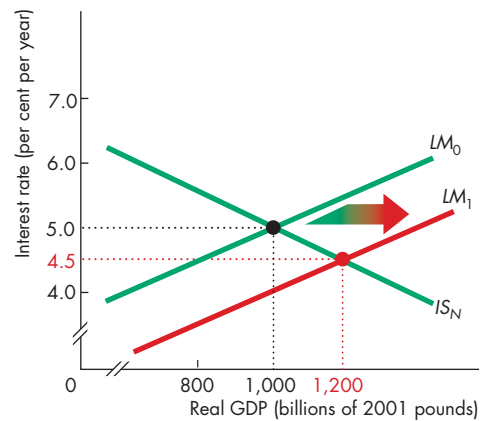
An extreme Keynesian outcome occurs when the *LM* curve is horizontal (LM_H). The *LM* curve is horizontal only if there is a “liquidity trap” – a situation when people are willing to hold any quantity of money at a specific rate of interest. The extreme monetarist case occurs when the *LM* curve is vertical (LM_V) – the demand for money is insensitive to the interest rate. Expansionary fiscal policy shifts the *IS* curve rightward from IS_0 to IS_1 in parts (c) and (d) of Figure A28.4.

Figure A28.4

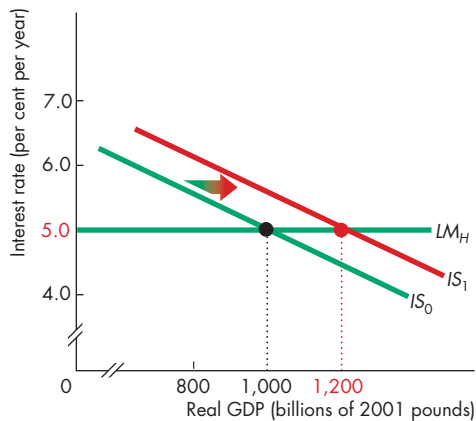
Fiscal Policy and Monetary Policy



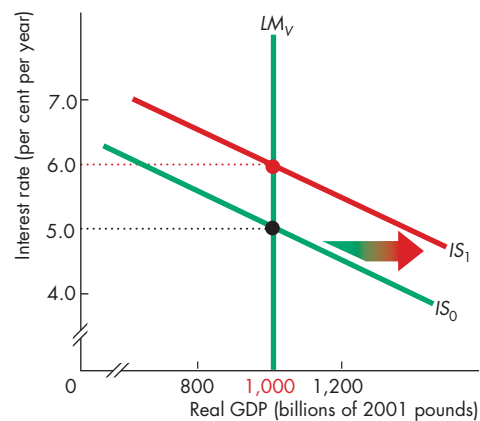
(a) Fiscal policy: normal case



(b) Monetary policy: normal case



(c) Fiscal policy: maximum effect on GDP



(d) Fiscal policy: no effect on GDP

In part (a), expansionary fiscal policy shifts the IS curve rightward. The interest rate rises and real GDP increases. In part (b), expansionary monetary policy shifts the LM curve rightward. The interest rate falls and real GDP increases. In part (c), the LM curve is horizontal – extreme

Keynesian case. Expansionary fiscal policy does not change the interest rate and no crowding out occurs. In part (d), the LM curve is vertical – extreme monetarist case. Expansionary fiscal policy increases the interest rate and complete crowding out occurs.

In the extreme Keynesian case in part (c), the interest rate does not change and real GDP increases by the same amount as the shift of the IS curve. Crowding out does not occur.

In the extreme monetarist case in part (d), the interest rate rises and real GDP does not change. The higher interest rate reduces interest-sensitive expenditure by an amount equal to the initial increase in aggregate expenditure. Complete crowding out occurs because the demand for money is completely insensitive to the interest rate.

The extreme monetarist case shows that fiscal policy is completely ineffective and the extreme Keynesian case shows that fiscal policy is fully effective.

In contrast to fiscal policy, you can see that in the extreme Keynesian case monetary policy is ineffective. In Figure A28.4(c), the LM curve is horizontal, which tells us that any increase in the quantity of money is willingly held – the demand for money is perfectly elastic – at the specific interest rate. So an increase in the quantity of money with a given fiscal policy (IS curve) will not bring about a fall in the interest rate. Real GDP will remain the same.

In the extreme monetarist case in Figure A28.4(d), an increase in the quantity of money shifts the LM curve rightward. With a given fiscal policy (IS curve), the interest rate falls and real GDP increases.

The Aggregate Demand Curve

We can use the *IS–LM* model to derive the aggregate demand curve. In the example on pp. 648–650, the quantity of real money is £600 billion. Suppose that the quantity of *nominal* money is £660 billion and the price level is 110. If the price level was 120, the quantity of real money would be £550 billion. (£660 billion divided by 120 multiplied by 100 = £550 billion.) And if the price level was 100, the quantity of real money would be £660.

Because there is a different quantity of real money for each price level, there is a different *LM* curve at each price level. Figure A28.5(a) illustrates the *LM* curves for the three price levels we’ve just considered.

The initial *LM* curve has the price level of 110. This *LM* curve is labelled LM_0 in Figure A28.5(a). When the price level is 120 and real GDP is £1,000 billion, the interest rate that achieves money market equilibrium is 6 per cent a year at point *G*. The entire *LM* curve shifts leftward to LM_1 to pass through point *G*.

When the price level is 100 and real GDP is £1,000 billion, the interest rate that achieves money market equilibrium is 4 per cent a year at point *H* in Figure A28.5(a). Again, the entire *LM* curve shifts rightward to LM_2 to pass through point *H*.

Because there are three *LM* curves in Figure A28.5, there are three *IS–LM* equilibrium points. When the price level is 110 and the *LM* curve is LM_0 , equilibrium is at point *E* where real GDP is £1,000 billion and the interest rate is 5 per cent a year. When the price level is 120 and the *LM* curve is LM_1 , equilibrium is at point *J* where real GDP is £900 billion and the interest rate is 5.5 per cent a year. And when the price level is 90 and the *LM* curve is LM_2 , equilibrium is at point *K* where real GDP is £1,100 billion and the interest rate is 4.5 per cent a year.

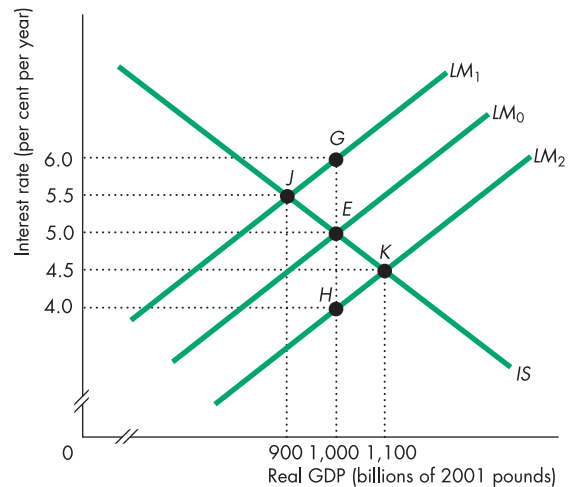
At each price level there is a different equilibrium real GDP and interest rate.

Figure A28.5(b) traces the aggregate demand curve. Notice that the price level is measured on the vertical axis of part (b) and real GDP on the horizontal axis. When the price level is 110, equilibrium real GDP is £1,000 billion (point *E*). When the price level is 120, equilibrium real GDP is £900 billion (point *J*). And when the price level is 100, real GDP demanded is £1,100 billion (point *K*). Each of these points corresponds to the same point in part (a).

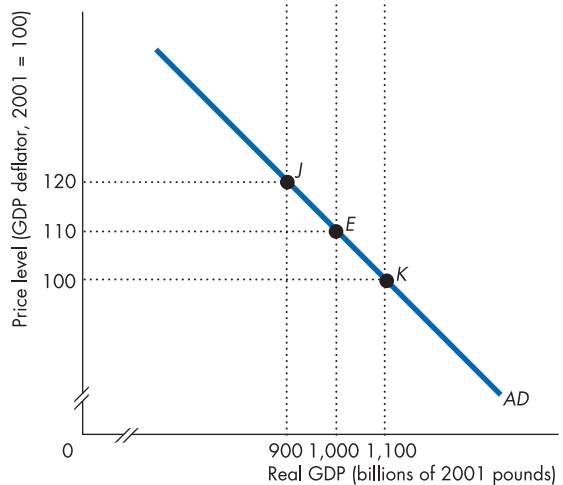
The line passing through points *J*, *E* and *K* in part (b) is the aggregate demand curve.

Figure A28.5

Deriving the Aggregate Demand Curve



(a) *IS* and *LM* curves



(b) Aggregate demand curve

In part (a), if the price level is 110, the *LM* curve is LM_0 and *IS–LM* equilibrium occurs at point *E*. The quantity of real GDP demanded is £1,000 billion. This combination of the price level of 110 and the quantity of real GDP demanded of £1,000 billion is point *E* on the *AD* curve in part (b).

If the price level rises to 120, the *LM* curve shifts leftward to LM_1 . The *IS–LM* equilibrium occurs at point *J* and a quantity of real GDP demanded of £900 billion – point *J* on the *AD* curve in part (b).

If the price level falls to 100, the *LM* curve shifts rightward to LM_2 . The *IS–LM* equilibrium occurs at point *K* and a quantity of real GDP demanded of £1,100 billion – point *K* on the *AD* curve in part (b).