chapter

19

Prices and Output in an Open Economy: Aggregate Demand and Aggregate Supply

LEARNING GOALS:

After reading this chapter, you should be able to:

- Understand how short- and long-run equilibrium is reached under fixed and flexible exchange rates with the aggregate demand and aggregate supply
- Understand how real and monetary shocks, and monetary and fiscal policies, affect the nation's aggregate demand and equilibrium
- Explain how monetary and fiscal policies can be used to adjust to supply shocks and stimulate growth in an open economy

19.1 Introduction

In our discussion of open-economy macroeconomics, we have generally assumed until now (except briefly in Sections 17.6 and 18.6) that prices remain constant as the economy expands and contracts. Only when the economy reaches the full-employment constraint would prices begin to rise. In the real world, however, prices rise and fall as the economy expands and contracts during the regular course of the business cycle. In this chapter, we relax the assumption of constant prices and examine the relationship between price and output in an open economy. We do so by using an aggregate demand and aggregate supply framework that incorporates the effects of international trade and capital flows.

We begin in Section 19.2 by reviewing the concepts of aggregate demand and aggregate supply, and by showing how equilibrium is determined at their intersection in the short run and in the long run in a closed economy. Section 19.3 then expands the presentation to examine the effect of international transactions on aggregate demand and aggregate supply under fixed and flexible exchange rates. Section 19.4 extends the analysis to examine the effect of real and monetary shocks as well as changes in fiscal and monetary variables on the nation's aggregate demand. In Section 19.5, we discuss the effect of monetary and fiscal policies in an open economy under flexible and fixed exchange rates. Finally, Section 19.6

focuses on monetary and fiscal policies to stimulate long-run growth and to adjust to supply shocks in open economies.

19.2 Aggregate Demand, Aggregate Supply, and Equilibrium in a Closed Economy

In this section, we begin by defining the aggregate demand curve and showing how it is derived from the *IS* and *LM* curves of the previous chapter. Then we examine the aggregate supply curve in the long run and in the short run. Finally, we look at how the interaction of the aggregate demand and supply curves determines equilibrium in a closed economy in the short run and in the long run.

19.2A Aggregate Demand in a Closed Economy

The aggregate demand (*AD*) curve shows the relationship between the total quantity demanded of goods and services in an economy and the general price level, while holding constant the nation's supply of money, government expenditures, and taxes. This is analogous to an individual's demand curve for a commodity, except that the *AD* curve refers to the *total* quantity demanded of domestic goods and services in the nation as a function of, or with respect to, the *general* price level or GDP deflator. The aggregate demand curve is downward sloping, indicating that the total quantity of domestic goods and services demanded in the nation is greater the lower the price level.

Figure 19.1 shows how the aggregate demand curve is derived from the *IS*–*LM* model of the previous chapter. Recall from Section 18.3 and Figure 18.2 that the *IS* curve shows the

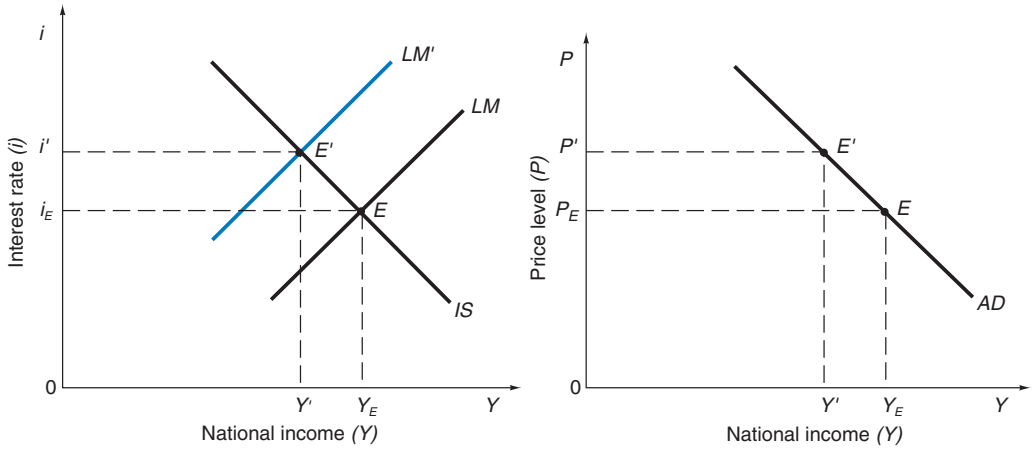

FIGURE 19.1. Derivation of the *AD* Curve from the *IS*–*LM* Curves.
The intersection of the *IS* and *LM* curves at a given price level determines the equilibrium interest rate (i_E) and national income (Y_E) at point *E* in the left panel. This defines point *E* at price P_E and income Y_E on aggregate demand curve *AD* in the right panel. An increase in price from P_E to P' reduces the real value of the nation's given money supply and causes the *LM* curve to shift to the left to *LM'*, thus resulting in the lower income level of Y' at point E' in the left panel and on the *AD* curve in the right panel.

various combinations of interest rates (i) and national income (Y) that result in equilibrium in the goods market (i.e., at which the quantity demanded of goods and services equals the quantity supplied). The LM curve, on the other hand, shows the various combinations of i and Y at which the demand for money is equal to the given supply of money, so that the money market is in equilibrium. Both the IS and LM curves are drawn for a given price level. The equilibrium level of national income (Y_E) and interest rate (i_E) is then determined at the intersection of the IS and LM curves (point E in the left panel of Figure 19.1). This defines point E on the aggregate demand curve (AD) in the right panel of Figure 19.1 at the given price level (P_E) and income level (Y_E). Note that both panels measure national income along the horizontal axis, but the right panel has the price level rather than the interest rate on the vertical axis.

Now suppose that prices in the nation rise from P_E to P'. This reduces the real value of the given money supply and causes the LM curve to shift to the left to LM'. The intersection of the IS and LM' curves at point E' in the left panel of Figure 19.1 defines the higher equilibrium interest rate of i' and the lower equilibrium level of national income of Y'. Note that the higher price does not directly affect the IS curve because equilibrium in the goods sector is measured in real terms. The higher equilibrium price P' and lower income level of Y' define point E' on aggregate demand curve AD in the right panel. Thus, higher prices are associated with lower levels of national income and result in an AD curve that is inclined downward. The steeper are the IS and the LM curves, the steeper or less elastic is the AD curve.

If prices were held constant and the money supply were changed instead, the entire AD curve would shift. For example, an increase in the money supply *for a given price level* (easy or expansionary monetary policy) shifts the LM curve to the right and results in a higher level of national income. This can be shown by a shift to the right of the entire AD curve to reflect the higher level of national income at the given price level (see Problem 3, with answer at the end of the book). Thus, national income can rise either if prices fall with a given money supply (a movement down an AD curve) or if the money supply is increased with constant prices (a rightward shift of the AD curve). Similarly, an increase in government expenditures and/or reduction in taxes (expansionary fiscal policy) shifts the IS curve to the right, and this also causes the AD curve to shift to the right, indicating a higher level of national income at each price level. On the other hand, tight or contractionary monetary and fiscal policies shift the AD curve to the left.

19.2B Aggregate Supply in the Long Run and in the Short Run

The aggregate supply (AS) curve shows the relationship between the total quantity supplied of goods and services in an economy and the general price level. This relationship depends crucially on the time horizon under consideration. Thus, we have a long-run aggregate supply curve and a short-run aggregate supply curve.

The long-run aggregate supply ($LRAS$) curve does not depend on prices but only on the quantity of labor, capital, natural resources, and technology available to the economy. The quantity of inputs available to an economy determines the natural level of output (Y_N) for the nation in the long run. The more inputs are available to the economy, the larger is its natural level of output and income in the long run. Since the long-run aggregate supply curve does not depend on prices, the $LRAS$ curve is vertical at the natural level of output when plotted against prices, as shown in Figure 19.2. Thus, higher prices do not affect

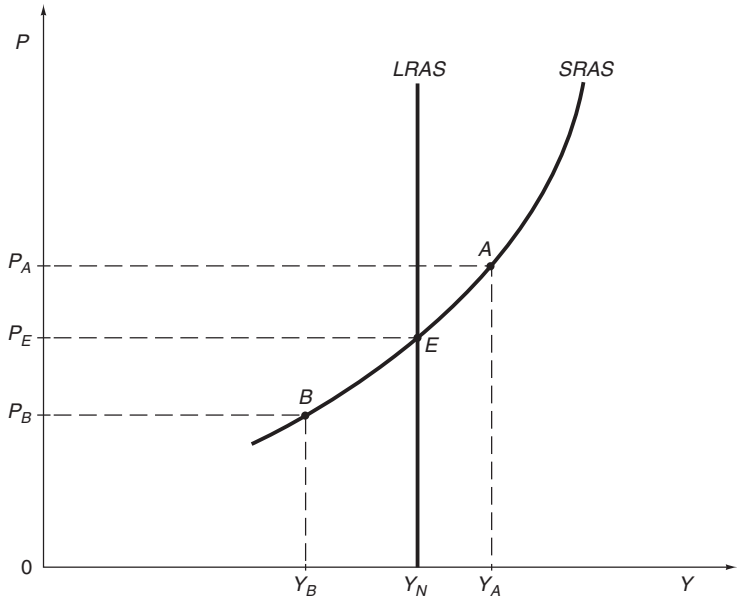

FIGURE 19.2. The Long-Run and Short-Run Aggregate Supply Curves.
The long-run aggregate supply curve *(LRAS)* is independent of prices and is vertical at the nation's natural level of output (Y_N), which depends on the availability of labor, capital, natural resources, and technology in the nation. The nation's short-run aggregate supply curve *(SRAS)* slopes upward, indicating that the nation's output can temporarily exceed (point *A*) or fall short (point *B*) of its natural level (point *E*) because of imperfect information or market imperfections.

output in the long run. The only way to increase output in the long run is for the economy to increase the supply of inputs or resources. Since this occurs only gradually over time, we assume no growth in our analysis, at least for now.

The short-run aggregate supply (*SRAS*) curve, on the other hand, slopes upward, indicating that higher prices lead to larger outputs in the short run (see Figure 19.2). The important question is why does output respond positively to price increases in the short run? And how can output in the short run ever exceed the long-run natural level? The short-run aggregate supply curve is upward sloping (so that the level of output can deviate temporarily from the natural level) because of imperfect information or market imperfections. For example, if firms find that they can sell their products at higher prices but do not realize immediately that input prices have also increased in the same proportion, they will temporarily increase output. As a result, aggregate output increases in the short run, say from point *E* to point *A* along the *SRAS* in Figure 19.2. When firms eventually realize *that their costs of production have also increased proportionately*, they will reduce production back to its original level, and so aggregate output returns to its long-run natural level but at the higher price level.

Thus, imperfect information or market imperfections can lead to short-run output levels in excess of the nation's long-run natural level. This is possible by employing workers on an overtime basis and running factories for longer or multiple shifts. Since it becomes progressively more difficult and expensive to continue increasing output in this manner, however, the short-run aggregate supply curve becomes steeper and steeper and eventually vertical (see Figure 19.2). In the long run, firms realize that all prices (and hence their costs)

have also increased proportionately and so they reduce production to the original level, with the result that the output of the nation returns to its lower long-run natural level, but at the higher price level prevailing.

The same can also occur in reverse. That is, if firms find that the prices they receive from the sale of their products have declined but do not immediately realize that the price of all products including their inputs have also fallen in the same proportion (and that their costs of production are also the same), they will cut production, and so the nation's output temporarily falls below its natural level (point *B* in Figure 19.2). In the long run, however, firms recognize their error and will increase output to the original long-run natural level (point *E* in Figure 19.2). The same process can be explained by focusing on market imperfections in labor markets (see Problem 5, with answer at the end of the book).

19.2c Short-Run and Long-Run Equilibrium in a Closed Economy

Given the aggregate demand curve and the short-run and long-run aggregate supply curves, we can examine the short-run and the long-run equilibrium in a closed economy with Figure 19.3. We begin at equilibrium point *E* at the intersection of aggregate demand curve

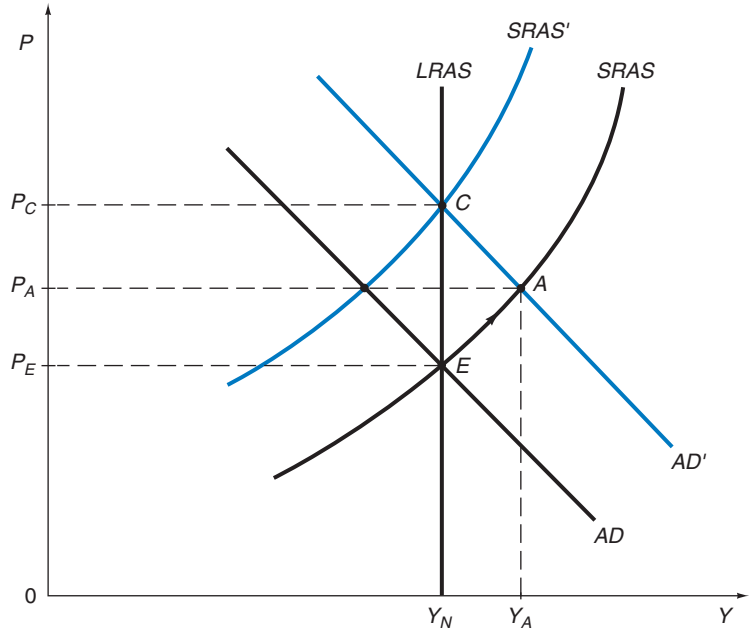

FIGURE 19.3. Equilibrium in a Closed Economy.
At the intersection of the *AD*, *LRAS*, and *SRAS* curves at point *E*, the nation is simultaneously in long-run and short-run equilibrium. An unexpected increase in *AD* to *AD'* defines the new short-run equilibrium point *A* at the intersection of *AD'* and *SRAS* curves at P_A and Y_A. Y_A exceeds the natural level of output of Y_N. In the long run, as expected prices increase and match actual prices, the *SRAS* curve shifts up to *SRAS'* and defines the new long-run equilibrium point *C* at the intersection of *AD'*, *LRAS*, and *SRAS'* curves at P_C and Y_N.

AD, long-run aggregate supply curve $LRAS$, and short-run aggregate supply curve $SRAS$ at the natural level of output Y_N and price level P_E. At point E, the economy is in long-run equilibrium and, therefore, also in short-run equilibrium. Suppose that now there is an unexpected rightward shift in the aggregate demand curve from AD to AD'. This causes prices to rise, but if firms do not immediately realize that all prices are rising and by mistake believe that only the price of the products they sell are rising, they will increase output. This defines the new short-run equilibrium point A at the intersection of the AD' and the $SRAS$ curves. At point A, the price is P_A and the level of output of the nation Y_A, which exceeds the natural level of output of Y_N.

As firms realize that all prices (including their costs of production) have in fact increased, the $SRAS$ curve will shift up to $SRAS'$. The intersection of the AD' and the $SRAS'$ curves on the $LRAS$ curve defines the new long-run equilibrium point C at the higher price of P_C and natural level of output of Y_N. The price level is now higher but the level of output has returned to its long-run natural level. The short-run increase in output resulting from imperfect information or market imperfection is entirely eliminated in the long run as firms realize that all prices, and hence their costs, have increased proportionately and cut production back to their long-run natural level. That is, in the long run, as expected prices rise to match actual prices, the $SRAS$ curve shifts up by the increase in the price level, and the nation's output returns to its lower long-run natural level.

Another way of explaining this is to say that an unexpected increase in aggregate demand leads to an unexpected increase in prices and a temporary increase in output. As expected prices increase in the long run to match the increase in actual prices, the short-run aggregate supply curve shifts up until it crosses the new and higher aggregate demand curve on the given long-run aggregate supply curve, so that the economy is once again simultaneously in long-run and short-run equilibrium at its natural level of output. Thus, a particular $SRAS$ curve is based on specific expected prices. When expected prices increase in the long run and match actual prices, the entire $SRAS$ curve shifts up by the increase in expected prices. A point to the right of the $LRAS$ curve means that actual prices exceed expected prices. Expected prices then increase and this shifts the $SRAS$ curve upward until expected prices are equal to actual prices, and the economy returns to its long-run natural level of output equilibrium. Note that the economy is in short-run equilibrium at the intersection of any AD and $SRAS$ curve. For the economy also to be in long-run equilibrium, the AD and $SRAS$ curves must intersect on the $LRAS$ curve.

In the absence of imperfect information or market imperfection (i.e., if firms did realize immediately that the increase in aggregate demand increased all prices so that price expectations always and immediately matched actual prices), then the nation would move immediately from equilibrium point E to equilibrium point C, without the intermediate movement to equilibrium point A in the short run. In that case, the nation's output would never deviate from its long-run natural level, and the nation's short-run aggregate supply curve would be vertical and coincide with the long-run aggregate supply curve. It is only because of imperfect information and market imperfections that short-run deviations in output from the long-run natural level occur in the real world (see Case Study 19-1). Of course, a downward shift in the aggregate demand curve would result in a temporary reduction in output and a permanent reduction in price (see Problem 6, with answer at the end of the book).

CASE STUDY 19-1 Deviations of Short-Run Outputs from the Natural Level in the United States

Figure 19.4 plots the gross domestic product (GDP) deflator on the horizontal axis (with 1971 = 100) as a measure of price increases and the adjusted growth of real GDP (with 1971 = 100) on the vertical axis for the United States from 1971 to 2011. The adjusted growth of real GDP was obtained by subtracting from the growth of real GDP in the United States in each year the average U.S. long-term real growth of 2.8 percent per year. Thus, the adjusted growth of real GDP provides an estimate of the short-run deviations of growth in real GDP from its long-run natural level (the horizontal line at the level of 100, after removing the 2.8 percent long-term growth trend) in the United States in each year. From the figure, we see that the adjusted or short-run growth in the United States temporarily deviated above and below its long-run natural rate, as predicted by theory, despite increases in the price level (GDP deflator) and other short-run disturbances. Note that Figure 19.4 is similar to Figures 19.2 and 19.3 except that the GDP deflator is plotted along the horizontal axis and the adjusted growth of real GDP is plotted along the vertical axis, rather than vice versa.

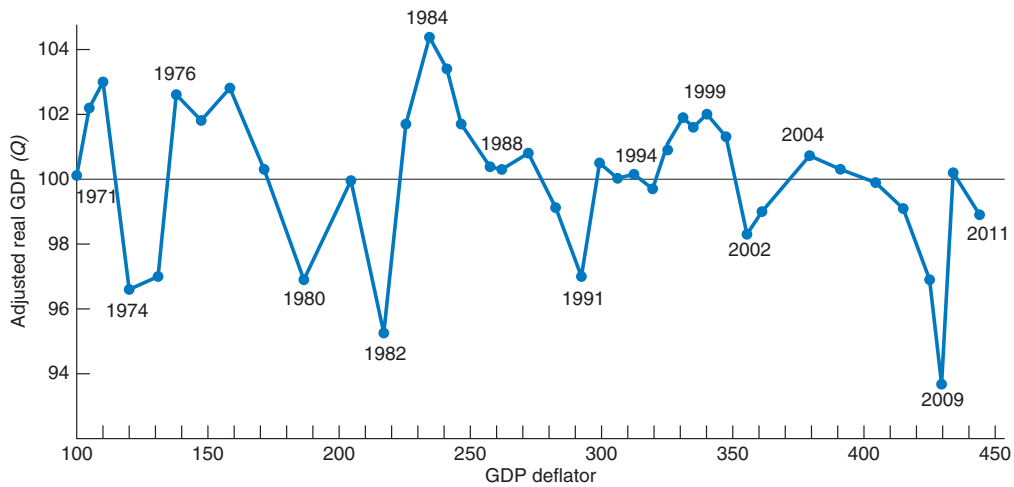

FIGURE 19.4. Short-Run Output Deviations from the Natural Level in the United States.
The adjusted or short-run growth of real GDP in the United States (with 1971 = 100) deviated above and below its natural or long-run level (the horizontal line at the level of 100 after removing the 3 percent long-term growth trend), but only temporarily, as predicted by theory, despite increases in prices (GDP deflator) and other short-run disturbances.
Source: Organization Economic Cooperation and Development, *Economic Outlook* (Paris, various issues).

19.3 Aggregate Demand in an Open Economy under Fixed and Flexible Exchange Rates

Although important long-run supply effects can result, opening the economy affects primarily aggregate demand in the short and medium runs (the time frame for most economic policies). In this section, we examine the aggregate demand effects of opening up the

economy, first in the case of fixed exchange rates and then under flexible exchange rates. To reflect the high (though not perfect) international capital mobility among industrial countries today, we will draw the *BP* curve (which refers to the balance of payments) as positively sloped but flatter than the *LM* curve.

19.3A Aggregate Demand in an Open Economy under Fixed Exchange Rates

Figure 19.5 shows the derivation of an open economy's aggregate demand curve under fixed exchange rates and compares it to the aggregate demand curve derived in Figure 19.1 for the closed economy. The left panel of Figure 19.5 shows original equilibrium point E in the goods and money markets and in the balance of payments at i_E and Y_E, as in Figure 18.2 (except that now the *BP* curve is flatter than the *LM* curve). This gives point E in the right panel of Figure 19.5.

Suppose now that prices in the nation rise from P_E to P'. This reduces the real value of the nation's given money supply and causes the *LM* curve to shift to the left to LM', exactly as in the closed-economy case. With the economy now open, however, there is an additional international effect that must be considered in deriving the nation's aggregate demand curve. That is, the increase in domestic prices from P_E to P' also reduces the nation's exports and increases the nation's imports and causes the *IS* and the *BP* curves also to shift to the left to, say, IS' and BP'. The *IS* curve shifts to the left because of the worsened trade balance. The *BP* curve shifts to the left because higher interest rates are now required at each level of income to attract sufficient additional capital from abroad to compensate for the worsened trade balance that results from the increase in domestic prices.

The intersection of the LM', BP', and IS' curves in the left panel of Figure 19.5 determines new equilibrium point E''. At point E'', the interest rate (i_E) happens to be the same

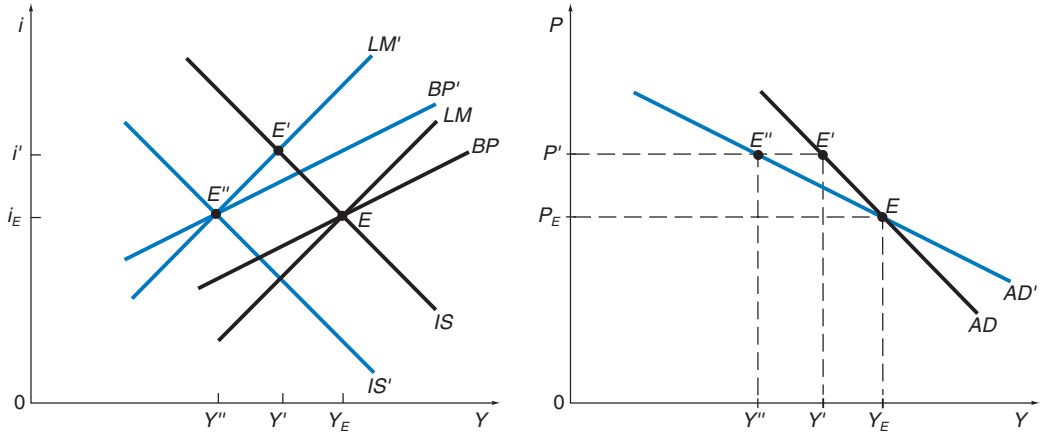

FIGURE 19.5. Derivation of a Nation's Aggregate Demand Curve under Fixed Exchange Rates.
From equilibrium point *E* at the intersection of the *LM*, *IS*, and *BP* curves at price level P_E and income Y_E in the left panel, we get point *E* in the right panel. An increase in the price level to P' causes the *LM*, *BP*, and *IS* curves to shift to the left to LM', BP' and IS', thus defining new equilibrium point E'', where these curves intersect. By joining points *E* and E'' in the right panel, we derive open-economy aggregate demand curve AD', which is flatter or more elastic than closed-economy aggregate demand curve *AD*.

as at the original equilibrium point E before the increase in prices in the nation, but prices are higher (P' instead of P_E), and the level of national income is lower (Y'' instead of Y_E). This gives point E'' in the right panel of Figure 19.5. Joining points E and E'' in the right panel gives demand curve AD' for this open economy. Note that AD' is flatter or more elastic than closed-economy aggregate demand curve AD derived earlier because when the economy is open we have the additional effect resulting from international trade and international capital flows that was not present when the economy was closed. Furthermore, the more responsive exports and imports are to the change in domestic prices, the more elastic the AD' curve is in relation to the AD curve (assuming, of course, that the Marshall–Lerner condition is satisfied—see Section 16.4B).

How do we know that the LM' and IS' curves intersect exactly on the BP' curve (as at point E'' in the left panel of Figure 19.5) so that the nation would be once again simultaneously in equilibrium in all three markets? The answer is that if the LM' curve intersected the IS' curve at a point above the BP' curve, the interest rate in the nation would be higher than required for balance-of-payments equilibrium. The nation would then have a surplus in the balance of payments. Under a fixed exchange rate system, the surplus in the nation's balance of payments would result in an inflow of international reserves and thus an increase in the nation's money supply, which would shift the LM' down sufficiently to intersect the IS' curve on the BP' curve, so that the nation would be simultaneously in equilibrium in the goods and money markets and in the balance of payments, as at point E''. The opposite would occur if the LM' and IS' curves crossed below the BP' curve.

19.3B Aggregate Demand in an Open Economy under Flexible Exchange Rates

Figure 19.6 shows the derivation of an open economy's aggregate demand curve under flexible exchange rates and compares it to the aggregate demand curve that we derived in Figure 19.1 for the closed economy and in Figure 19.5 for an open economy under fixed exchange rates. The left panel of Figure 19.6 shows original equilibrium point E in the goods and money markets and in the balance of payments at i_E and Y_E, as in Figure 19.5. This gives point E in the right panel of Figure 19.6.

Now suppose that prices in the nation rise from P_E to P'. This reduces the real value of the nation's given money supply and causes the LM curve to shift to the left to LM'. The increase in domestic prices also reduces the nation's exports and increases the nation's imports and causes the IS and the BP curves to also shift to the left to, say, IS' and BP' exactly as in Figure 19.5. Now, however, the LM' and IS' curves cross at point E'', which is above the BP' curve (point H). This means that the nation has a surplus in its balance of payments. With flexible exchange rates, instead of the nation's money supply increasing and shifting the LM curve to the right (as in the case of fixed exchange rates), the nation's currency appreciates so that the BP' curve shifts to the left again to BP''. This causes a further deterioration in the nation's trade balance and a further shift of the nation's IS' curve to IS'' until the LM' and IS'' curves intersect on the BP'' curve at point E^*, and the nation is once again simultaneously in equilibrium in the goods and services and money markets and in the balance of payments. This gives point E^* in the right panel. Joining points E and E^* in the right panel gives aggregate demand curve AD^*, which is flatter or more elastic than either AD or AD'.

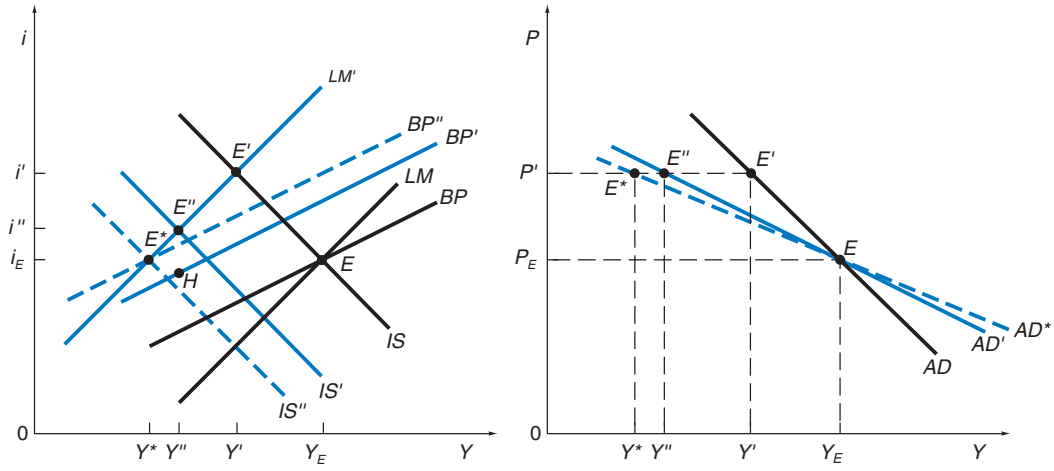

FIGURE 19.6. Derivation of the Nation's Aggregate Demand Curve under Flexible Exchange Rates.
Starting from equilibrium point *E* in the left and right panels, an increase in the price level to *P′* causes the *LM*, *BP*, and *IS* curves to shift to the left to *LM′*, *BP′*, and *IS′*. Since the *LM′* and *IS′* curves intersect above the *BP′* curve (i.e., point *E″* is above point *H*), the nation has a surplus in its balance of payments. The nation's currency then appreciates (i.e., the *BP′* curve shifts to the left to *BP″*). This causes the *IS′* curve to shift further to the left to *IS″* until the *LM′* and the *IS″* curves intersect on the *BP″* curve at point *E**. This gives point *E** in the right panel. Joining points *E* and *E** in the right panel gives aggregate demand curve *AD**, which is more elastic than *AD* and *AD′*.

Note that in the left panel of Figure 19.6, the interest rate at equilibrium point E^* is equal to i_E (the interest rate at the original equilibrium level), but this is only by coincidence. That is, i'' can also be higher or lower than i_E, depending on where the LM', BP'', and IS'' curves intersect. Note that if the LM' and IS'' curves intersected below the BP' curve rather than above it as in the left panel of Figure 19.6 (i.e., if point E^* had been below rather than above point H), then the nation would have a deficit in its balance of payments. In that case, the nation's currency would depreciate (i.e., the BP' curve would shift to the right and so would the IS' curve) until the LM' and IS'' curves intersected on the BP'' curve and the nation was in equilibrium in all three markets. If the LM' and IS' curves intersected on the BP' curve, there would be no change in the nation's exchange rate and no further shift in the BP' and IS' curves, so that the result would be the same as under fixed exchange rates.

19.4 Effect of Economic Shocks and Macroeconomic Policies on Aggregate Demand in Open Economies with Flexible Prices

In the real world, any change that affects the *IS*, *LM*, or *BP* curves can affect the nation's aggregate demand curve, depending on whether the nation operates under fixed or flexible exchange rates. In this section, we examine the effect of real and monetary shocks as well as fiscal and monetary policies on aggregate demand in open economies with flexible prices under fixed and flexible exchange rates.

19.4A Real-Sector Shocks and Aggregate Demand

Starting from equilibrium point E in both panels of Figure 19.7, suppose that the nation's exports increase or the nation's imports decrease because of an increase in foreign prices or a change in tastes at home or abroad. The increase in the nation's exports or reduction in the nation's imports in the face of constant domestic prices leads to an improvement in the nation's trade balance and causes the nation's IS and BP curves to shift to the right to IS' and BP'. Since the intersection of the IS' and LM curves at point E' is above the BP' curve, the nation would have a surplus in its balance of payments. Under fixed exchange rates, this leads to an inflow of international reserves and an increase in the nation's money supply, which causes a rightward shift in the LM curve to LM', thus defining new equilibrium point E''. The movement from point E to point E'' in the left panel of Figure 19.7 is shown by the shift in the nation's aggregate demand curve from AD to AD'' in the right panel. That is, at the given domestic price of P_E, the nation's output is now Y'' instead of Y because of the autonomous increase in the nation's exports or reduction in the nation's imports.

The result is different if the nation had flexible exchange rates, but we can still utilize Figure 19.7 to analyze this case. With flexible exchange rates, the potential surplus in the nation's balance of payments resulting at point E' in the left panel of Figure 19.7 leads to an appreciation of the nation's currency and a leftward shift of the BP' curve back to its original position of BP (instead of the nation's money supply increasing and causing the LM curve to shift to the right to LM', as in the fixed exchange rate case). The appreciation of the nation's currency (and leftward shift of the BP' curve back to BP) is accompanied by a leftward shift in the IS' curve back to its original IS position (as the trade balance returns to its original level as a result of the appreciation of the nation's currency). Thus, an autonomous improvement in the nation's trade balance has no lasting effect on the nation's

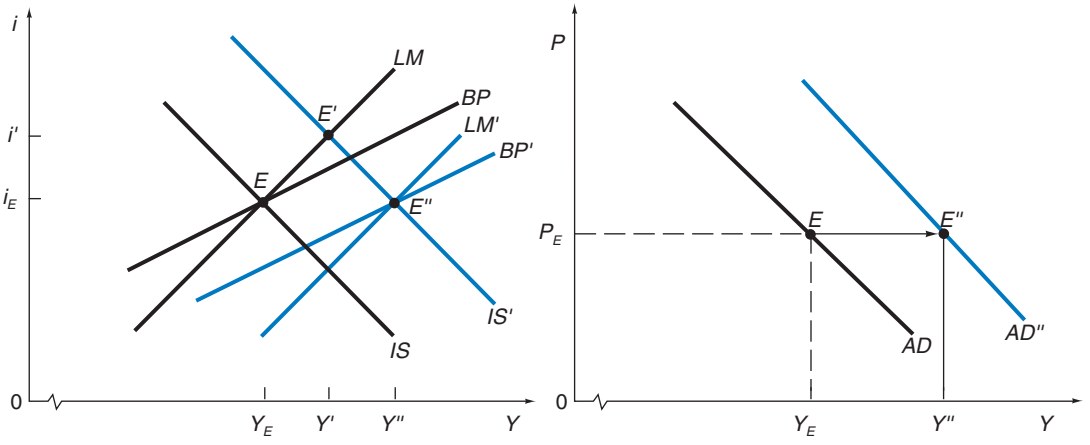

FIGURE 19.7. Changes in the Nation's Trade Balance and Aggregate Demand.
Starting from point E in both panels, an increase in the nation's exports and/or reduction in the nation's imports with unchanged domestic prices causes the IS and BP curves to shift rightward to IS' and BP'. Under fixed exchange rates, this leads to a surplus in the nation's balance of payments and a rightward shift of the LM curve to LM', which defines new equilibrium point E''. Thus, the AD curve shifts rightward to AD''. With flexible exchange rates, the nation's currency appreciates so that the BP' and IS' curves shift back to BP and IS at original equilibrium point E in both panels.

level of output and aggregate demand (i.e., the nation returns to equilibrium point E in the left panel and point E on aggregate demand curve AD in the right panel) under flexible exchange rates. An autonomous worsening of the nation's trade balance would have the opposite effect.

19.4B Monetary Shocks and Aggregate Demand

Starting from equilibrium point E in both panels of Figure 19.8, suppose that there is a short-term capital inflow to or reduced capital outflow from the nation as a result of a reduction in interest rates abroad or a change in tastes at home or abroad. This leads to a rightward shift of the BP curve to BP' in both panels. With fixed exchange rates, the fact that point E is above the BP' curve means that the nation has a surplus in its balance of payments (see the left panel of Figure 19.8). This leads to an inflow of international reserves and an increase in the nation's money supply, which cause the nation's LM curve to shift to the right to LM', thus defining new equilibrium point E'' at higher income Y''. Since domestic prices are unchanged at the higher level of national income, this means that the nation's aggregate demand curve (not shown in the figure) shifts to the right.

If, on the other hand, the nation operated under flexible exchange rates, the rightward shift in the BP curve to BP' leads to a potential surplus in the nation's balance of payments (see the right panel of Figure 19.8). This causes the nation's currency to appreciate so that the nation's trade balance worsens. These changes are shown by a leftward shift of the BP' and IS curves to BP'' and IS' until new equilibrium point E'' is reached, at which the LM, BP'', and IS' curves intersect at the given price level and lower national income of Y''.

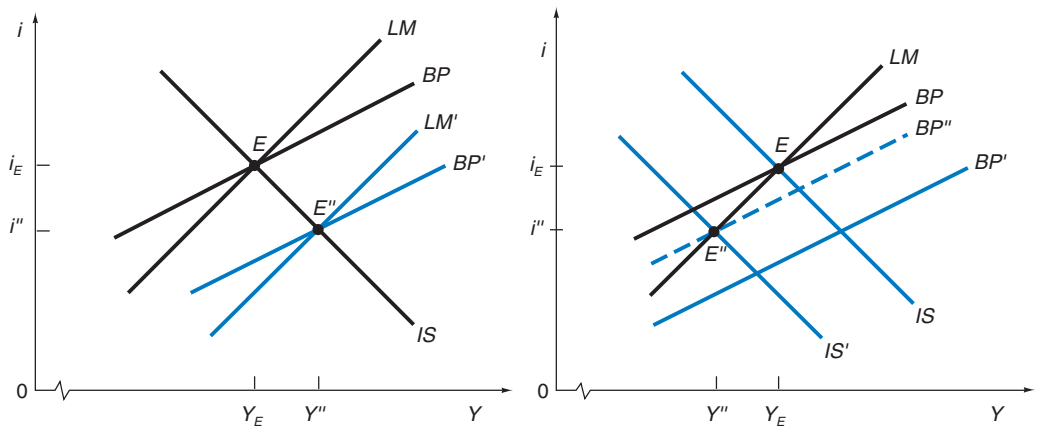

FIGURE 19.8. Short-Term Capital Flows and Aggregate Demand.
Starting from equilibrium point E in both panels, an autonomous short-term capital inflow with unchanged domestic prices and fixed exchange rates causes the nation's BP and LM curves to shift rightward to BP' and LM', thus defining new equilibrium point E'' with higher national income Y'' in the left panel. Thus, the nation's aggregate demand curve (not shown in the figure) shifts to the right. With flexible exchange rates (the right panel), the nation's currency appreciates, so that the BP' and IS curves shift to the left to BP'' and IS', and they define new equilibrium point E'' along the original LM curve, so that the nation's aggregate demand curve shifts to the left.

As a result, the nation's aggregate demand curve (not shown in the figure) shifts to the left. Thus, a short-term capital inflow leads to a rightward shift of the nation's aggregate demand curve under fixed exchange rates but a leftward shift under flexible rates. The exact opposite occurs with an autonomous short-term capital outflow from the nation.

19.4c Fiscal and Monetary Policies and Aggregate Demand in Open Economies

We have seen in Section 18.4c that under highly elastic short-term international capital flows (i.e., with the *BP* curve flatter than the *LM* curve) fiscal policy is effective while monetary policy is not, whereas the opposite is the case under flexible rates.

Specifically, under fixed exchange rates and highly elastic short-term international capital flows, expansionary fiscal policy will lead to capital inflows and is very effective in shifting the nation's aggregate demand curve to the right. Similarly, contractionary fiscal policy will lead to capital outflows and is very effective in shifting the nation's aggregate demand curve to the left. On the other hand, under fixed exchange rates and high international capital flows, monetary policy is not effective because any attempt by the nation to lower interest rates by increasing the nation's money supply (easy monetary policy) will simply lead to a capital outflow with little if any effect on the nation's aggregate demand.

Under flexible exchange rates and high international short-term capital flows, the opposite is the case. That is, easy monetary policy will be very effective in shifting the nation's aggregate demand curve to the right, and tight monetary policy will be effective in shifting the nation's demand curve to the left. On the other hand, fiscal policy will be ineffective since short-term international capital flows will offset much of the effect of any fiscal policy. Thus, in examining the effect of macroeconomic policies in open economies with flexible prices and highly elastic short-term international capital flows, we will concentrate on fiscal policy under fixed exchange rates and on monetary policy under flexible exchange rates.

We can summarize the effect of economic shocks and macroeconomic policies on aggregate demand under the present conditions of highly elastic short-term international capital flows and flexible prices as follows:

1. Any shock that affects the real sector of the economy affects the nation's aggregate demand (*AD*) curve under fixed exchange rates but not under flexible exchange rates. For example, an autonomous improvement in the nation's trade balance shifts the *AD* curve to the right under fixed exchange rates but not under flexible exchange rates. The reverse is also true.

2. Any monetary shock affects the nation's aggregate demand curve under both fixed and flexible exchange rates—but in opposite directions. For example, an autonomous increase in short-term capital inflows to the nation causes the nation's *AD* curve to shift to the right under fixed exchange rates and to the left under flexible exchange rates. The reverse is also true.

3. Fiscal policy is effective under fixed exchange rates but not under flexible exchange rates. The opposite is true for monetary policy. For example, expansionary fiscal policy—but not monetary policy—can be used to shift the *AD* curve to the right under fixed exchange rates, but monetary policy—not fiscal policy—can be used to shift the nation's *AD* curve to the right under flexible exchange rates.

19.5 Effect of Fiscal and Monetary Policies in Open Economies with Flexible Prices

We have seen in the previous section that under fixed exchange rates and highly elastic short-term international capital flows, fiscal policy is effective whereas monetary policy is ineffective. On the other hand, with flexible exchange rates, monetary policy is effective and fiscal policy is not. Thus, we examine here fiscal policy under fixed exchange rates and monetary policy under flexible rates.

Let us begin by examining the effect of expansionary fiscal policy under fixed exchange rates from initial equilibrium point E, where the AD and $SRAS$ curves cross on the $LRAS$ curve at the nation's natural level of output of Y_N and price level of P_E in the left panel of Figure 19.9 (as in Figure 19.3). An expansionary fiscal policy that shifts the AD curve up to AD' defines new short-run equilibrium point A at the intersection of the AD' and $SRAS$ curves at P_A and Y_A, with Y_A exceeding Y_N. The temporary expansion of output to Y_A occurs because of market imperfections or imperfect information as described in Section 19.3 for a closed economy. That occurs because firms originally believe that only the price of the products they sell has increased and actual prices temporarily exceed expected prices.

Over time, however, as firms realize that all prices (including their costs of production) have increased, the $SRAS$ curve will shift up to $SRAS'$. The intersection of the AD' and the $SRAS'$ curves on the $LRAS$ curve defines new long-run equilibrium point C at the higher price of P_C and natural level of output of Y_N. The price level is now higher, but the level

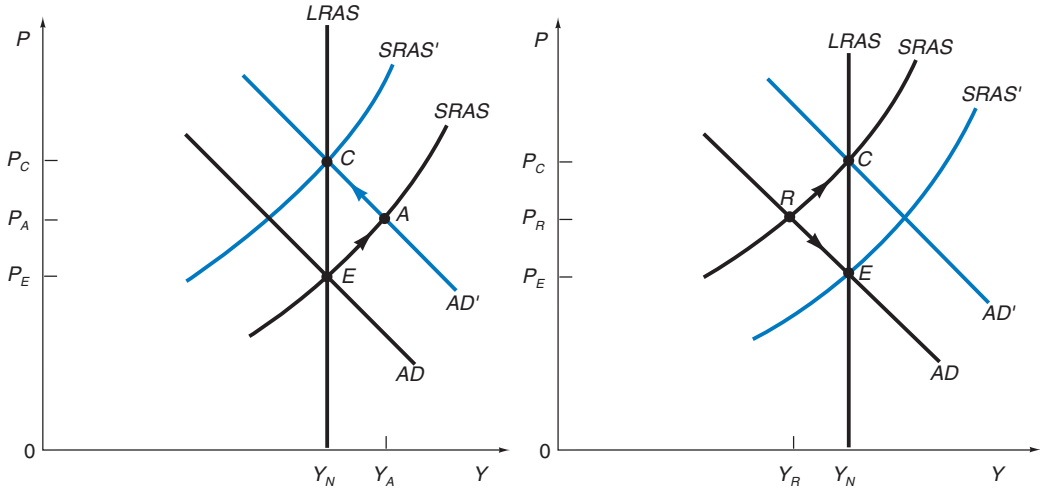

FIGURE 19.9. Expansionary Fiscal Policy from the Natural Level of Output and Recession under Fixed Exchange Rates.

Starting from long-run equilibrium point E in the left panel, expansionary fiscal policy shifts the AD curve up to AD' and defines short-run equilibrium point A at P_A and $Y_A > Y_N$. In the long run, the $SRAS$ curve shifts up to $SRAS'$ defining equilibrium point C at P_C and Y_N. Starting from recession point R in the right panel with P_R and $Y_R < Y_N$, the nation could use expansionary fiscal policy to shift the AD curve up to AD' so as to reach equilibrium point C at P_C and Y_N at the intersection of the AD', $SRAS$, and $LRAS$ curves. The nation, however, could in time have reached equilibrium point E at P_E and Y_N automatically as a result of falling domestic prices because of recession and the $SRAS$ curve shifting down to $SRAS'$.

of output has returned to its lower long-run natural level. The short-run increase in output is entirely eliminated in the long run as expected prices rise to match the increase in actual prices. Note that this is exactly the same as in the closed-economy case. The only difference is that now we are dealing with an open economy. But if we assume, as we do, that the effect of openness in the economy has already been incorporated into the AD and AD' curves, the process by which the nation's output temporarily exceeds but then returns to its long-term natural level at higher prices is exactly the same. More interesting and realistic is the case where the nation uses expansionary fiscal policy from a condition of recession, such as point R at P_R and $Y_R < Y_N$ in the right panel of Figure 19.9. Starting from point R in the right panel, the expansionary fiscal policy that shifts the AD curve to the right at AD' results in new long-run equilibrium point C, where the AD' and $SRAS$ curves intersect on the $LRAS$ curve at higher price level P_C and natural level of output Y_N. Note that the movement for short-run equilibrium point R to long-run equilibrium point C now involves a movement along the $SRAS$ curve.

The nation, however, could have reached equilibrium point E in the long run at the intersection of the AD and $SRAS'$ curves on the $LRAS$ curve without any expansionary fiscal policy by simply allowing market forces to work themselves out. That is, because at point R output level Y_R is below the natural output level of Y_N, all prices, including firms' costs, are expected to fall, and as prices actually fall, the $SRAS$ curve shifts down to $SRAS'$, so as to intersect the unchanged AD curve at point E on the $LRAS$ curve. The nation is now at long-run and short-run equilibrium at the natural level of output of Y_N and lower price level P_E. Note that the movement down the given AD curve from point R to point E reflects not only the closed-economy increase in the aggregate quantity of goods and services demanded as a result of lower domestic prices (as described in Section 19.2A) but also the improvement in the nation's trade balance as a result of lower domestic prices (as described in Section 19.3).

But why then should the nation adopt an expansionary fiscal policy to overcome the recession at point R if this causes inflation, if the recession would be automatically eliminated anyway by lower prices? The reason is that waiting for market forces to overcome the recession might take too long. This is especially likely to be the case if prices are not very flexible downward. Economists who believe that prices are sticky and not very flexible downward favor the use of expansionary fiscal policy. Those who believe that expansionary fiscal policy leads to the expectation of further price increases and inflation prefer that a recession be corrected automatically by market forces without any expansionary fiscal policy.

The effect of monetary policy under flexible exchange rates is qualitatively the same as the effect of fiscal policy under fixed exchange rates (and so we can continue to use Figure 19.9) once we have incorporated into the nation's aggregate demand curve the different adjustment taking place under flexible exchange rates rather than under fixed exchange rates. That is, starting from a position of long-run equilibrium, an easy monetary policy shifts the AD curve to the right, and this leads to a temporary expansion of the nation's output. In the long run, however, as expected prices rise to match the increase in actual prices, the $SRAS$ curve shifts up and defines a new equilibrium point at the natural level of output but higher prices.

With flexible exchange rates, the nation's currency will also have depreciated. Similarly, starting from a position of recession, monetary policy can speed the movement to the higher natural level of output but only at the expense of higher prices. The alternative is for the economy to allow the recession to be corrected automatically by market forces. In that case, the nation would end up with lower prices and an appreciated currency. The problem,

CASE STUDY 19-2 Central Bank Independence and Inflation in Industrial Countries

Figure 19.10 shows the relationship between central bank independence and average inflation in industrial countries from 1955 to 1988. The figure shows that nations with more independent central banks (Germany, Switzerland, and the United States) have had less inflation than nations with less independent central banks (New Zealand, Spain, Italy, the United Kingdom, and France). Specifically, when excessively expansionary fiscal policies push up interest rates and cause an appreciation in the nation's currency, monetary authorities come under increasing pressure from the electorate and fiscal policymakers to counter such effects by expanding the money supply to "accommodate" the increased money demand. If monetary authorities do not resist such pressures (i.e., if the central bank is not sufficiently independent) and comply, the outcome will be inflation. In the United States, the Fed (which operates as the U.S. central bank) is semiautonomous and to a large extent independent of the executive branch, which is in charge of expenditures and taxation (fiscal policy). Thus, the United States has had a better inflation performance than the United Kingdom or France with less independent central banks. In recessionary periods, elected officials and the electorate generally demand easier or more expansionary monetary policy under the threat of reduced central bank independence. A case in point was the 1991–1992 recession in the United States, when the Fed came under strong pressure to ease monetary policy. The Fed needed no prodding and slashed interest rates six times—from 6.5 percent to 1.0 percent—during the 2001 recession.

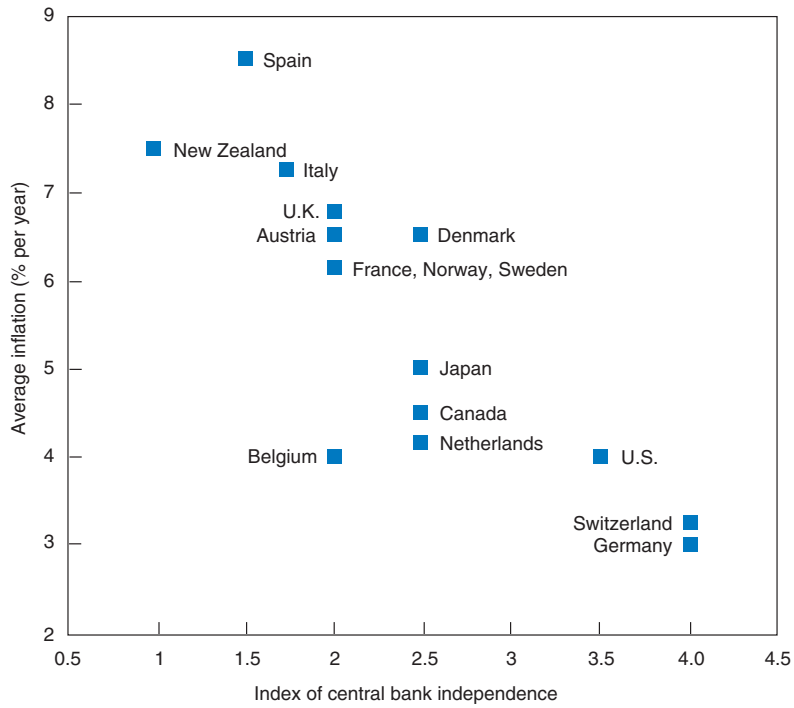

FIGURE 19.10. Index of Central Bank Independence and Average Inflation.
Nations such as Germany, Switzerland, and the United States with more independent central banks have had less inflation than nations such as New Zealand, Spain, Italy, the United Kingdom, and France with less independent central banks.
Source: A. Alesina and L. H. Summers, "Central Bank Independence and Macroeconomic Performance: Some Comparative Evidence," *Journal of Money, Credit and Banking*, May 1993, p. 155.

CASE STUDY 19-3 Inflation Targeting—A New Approach to Monetary Policy

Starting in 1990, some nations adopted inflation targeting as a new approach to monetary policy based on achieving a specific target for inflation. What makes this approach new and different is the explicit public commitment to control inflation with transparency and accountability. By 2012, 26 countries (about half developed and half developing) had adopted the policy (see Table 19.1). Furthermore, the U.S. Federal Reserve, the European Central Bank, the Bank of Japan, and the Swiss National Bank have also adopted many of the main elements of inflation targeting, and others are moving in that direction. In general, inflation-targeting nations seek to achieve the inflation target over the medium term (usually over a two- to three-year horizon) rather than at all times.

Table 19.1 indicates the nations that adopted inflation targeting, the date that they adopted it, the inflation rate at the adoption date, the average inflation rate in 2009, and the target inflation rate (given either as a range or as a rate, plus or minus a specified percentage, usually 1 percent). Although inflation and growth rates improved in most countries over the 1991–2009 period, inflation targeters improved more, experienced less volatility in inflation and growth, and were less adversely affected by global economic crises than other countries.

TABLE 19.1. Inflation Targeters

Country	Inflation targeting adoption date	Inflation rate at adoption date	2009 average inflation rate	Target inflation rate
New Zealand	1990	3.3	0.8	1 – 3
Canada	1991	6.9	0.3	2 +/–1
United Kingdom	1992	4.0	2.2	2 +/–1
Sweden	1993	1.8	–0.3	2 +/–1
Australia	1993	2.0	1.9	2 –3
Czech Republic	1997	6.8	1.0	3 +/–1
Israel	1997	8.1	3.3	2 +/–1
Poland	1998	10.6	3.8	2.5 +/–1
Brazil	1999	3.3	4.9	4.5 +/–2
Chile	1999	3.2	1.5	3 +/–1
Colombia	1999	9.3	4.2	2 – 4
South Africa	2000	2.6	7.1	3 – 6
Thailand	2000	0.8	–0.9	0.5 – 3
Korea	2001	2.9	2.8	3 +/–1
Mexico	2001	9.0	5.3	3 +/–1
Iceland	2001	4.1	12.0	2.5 +/–1.5
Norway	2001	3.6	2.2	2.5 +/–1
Hungary	2001	10.8	4.2	3 +/–1
Peru	2002	–0.1	2.9	2 +/–1
Philippines	2002	4.5	1.6	4.5 +/–1
Guatemala	2005	9.2	1.8	5 +/–1
Indonesia	2005	7.4	4.6	4 – 6
Romania	2005	9.3	5.6	3.5 +/–1
Turkey	2006	7.7	6.3	6.5 +/–1
Serbia	2006	10.8	7.8	4 – 8
Ghana	2007	10.5	19.3	14.5 +/–1

Source: S. Roger, ''Inflation Targeting Turns 20'', *Finance & Development*, March 2010, pp. 47.

however, is that if prices are sticky and not too flexible downward, then the process may take too long. In that case, the cost of inflation from easy monetary policy may be lower than the large opportunity cost of lost output and employment from a protracted recession. There is some evidence that nations with more independent central banks suffer less inflation than nations with central banks that are less independent and more responsive to political pressures (see Case Study 19-2) and so do nations that adopt inflation targeting (see Case Study 19-3).

19.6 Macroeconomic Policies to Stimulate Growth and Adjust to Supply Shocks

In this section, we examine fiscal and monetary policies to stimulate long-run growth and adjust to supply shocks in open economies with flexible prices.

19.6A Macroeconomic Policies for Growth

Although fiscal and monetary policies are used primarily to affect aggregate demand in the short and medium runs, they can also be used to stimulate long-run growth in the economy (i.e., to shift the *LRAS* curve to the right). Governments can stimulate long-run growth by increasing expenditures on education, infrastructures, basic research, and to improve the functioning of markets. Governments can also stimulate long-run growth by tax incentives and low long-term interest rates to encourage private investment. It must be pointed out, however, that the process of long-run growth is not yet entirely understood. To the extent that efforts to stimulate long-run growth in the economy are successful, however, they will shift the nation's *LRAS* curve to the right, leading to more employment, higher incomes, lower prices, and possibly an appreciated currency in the long run.

The use of expansionary macroeconomic (i.e., fiscal and monetary) policies to stimulate growth can be examined with Figure 19.11. We begin at long-run equilibrium point E where the nation's AD and $SRAS$ curves intersect on the $LRAS$ curve at P_E and Y_N. Suppose that now the nation uses expansionary fiscal and/or monetary policies to stimulate long-run growth. The AD curve then shifts to the right to, say, AD', so that the nation reaches new short-run equilibrium point A at P_A and $Y_A > Y_N$. (So far, this is the same as in the left panel of Figure 19.9.) To the extent that the expansionary macroeconomic policies do in fact stimulate long-run growth, however, the $LRAS$ and $SRAS$ curves shift to the right to $LRAS'$ and $SRAS''$ and define new long-run equilibrium point G at P_G $(= P_E)$ and $Y'_N > Y_N$ at the intersection of the $LRAS'$, $SRAS''$, and AD' curves (see Figure 19.11).

Growth has led to a higher level of natural output and no increase in prices in relation to original equilibrium point E. Thus, instead of expansionary macroeconomic policy leading to an upward shift in the $SRAS$ curve and the same original level of natural output and much higher prices in the long run in the absence of growth (point C, as in the left panel of Figure 19.9), with growth, the nation reaches a higher level of natural output and no long-run increase in prices. With growth, however, prices could be higher or lower as compared with the original long-run equilibrium level. It all depends on how far to the right the $LRAS$ and $SRAS$ curves shift in relation to the AD curve as a result of expansionary macroeconomic policies aimed at growth. The greater is the rightward shift in the $LRAS$ and $SRAS$ curves

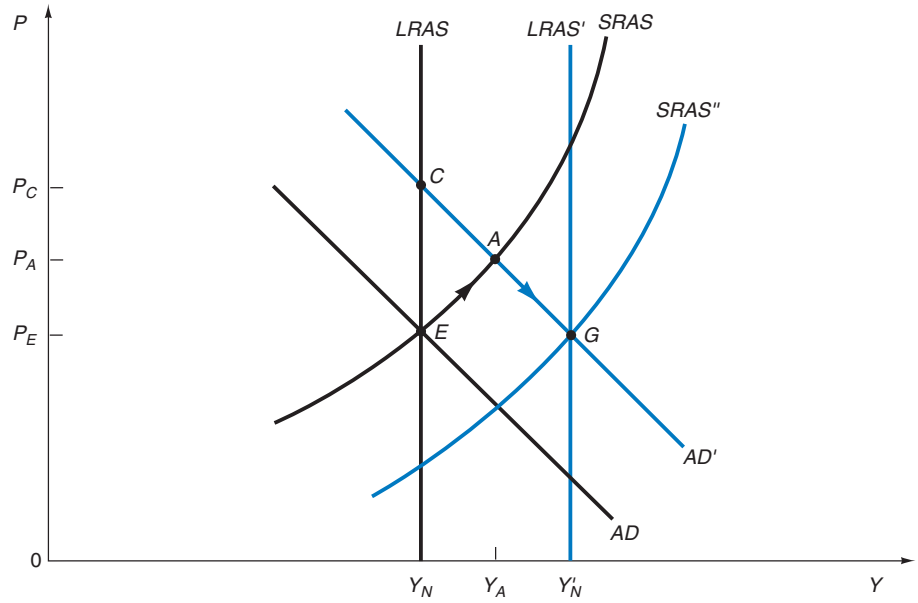

FIGURE 19.11. Macroeconomic Policies for Long-Run Growth.
Starting at original long-run equilibrium point *E*, expansionary macroeconomic policies for growth shift the *AD* curve to the right to *AD′* and define new short-run equilibrium point *A* at $P_A > P_E$ and $Y_A > Y_N$. With long-run growth, the *LRAS* and *SRAS* curves shift to the right to *LRAS′* and *SRAS″* and define equilibrium point *G* at $P_G = P_E$ and $Y'_N > Y_N$.

in relation to the *AD* curve, the greater is the increase in the natural level of output in the nation and the more likely it is that prices will be lower in the long run.

19.6B Macroeconomic Policies to Adjust to Supply Shocks

Macroeconomic policies can also be used to adjust to supply shocks. The most notorious of the postwar supply shocks was the sharp increase in petroleum prices engineered by OPEC (Organization of Petroleum Exporting Countries) between the autumn of 1973 and the end of 1974, and again from 1979 to 1981. The increase in petroleum prices increased production costs in all petroleum-importing countries and caused a leftward shift in their short-run and long-run supply curves. The effect on aggregate demand was less clear. At first sight, it might seem that petroleum-importing nations would suffer a deterioration of their balance of payments, a depreciation of their currencies, and thus a shift to the right in their aggregate demand curves. On closer reflection, however, we find that this need not be the case. The reason follows.

It is true that, because the demand for petroleum is inelastic, an increase in price led to higher total expenditures in all nonpetroleum-producing countries to purchase this crucial input. But the reduction in the natural level of output that accompanied the petroleum shock also induced a reduction in all other imports. Thus, the trade balance of petroleum-importing nations could worsen or improve, depending on which of these two opposing forces was stronger. But there is more. The *BP* curve refers to the balance of payments as a whole,

which includes both the trade balance and the balance on capital account. Thus, even if importing nations' trade balances deteriorated as the direct result of the increase in petroleum prices, their capital account could also improve if OPEC nations invested their higher petroleum earnings in industrial nations. This is in fact exactly what happened with the United States. Thus, it is impossible to determine a priori the net effect on importing nations' balance of payments resulting from the increases in petroleum prices. And if we look at the data, we find that the balance of payments improved in some nations and in some years and worsened in others after the two oil shocks; therefore, no general conclusion can be reached. In what follows, therefore, we assume that the aggregate demand curve of petroleum-importing nations remains unchanged as a result of the increase in petroleum prices. It would be a simple matter, however, to examine the situation where this is not the case, and that is left as an exercise.

With the above in mind, we can proceed to use our aggregate demand and aggregate supply framework to analyze the effect of a petroleum shock on industrial nations and the possible macroeconomic policies required to adjust to these shocks. This is done in Figure 19.12. We start at original long-run equilibrium point E with P_E and Y_N at the intersection of the *LRAS, SRAS*, and *AD* curves. The immediate effect of a large increase

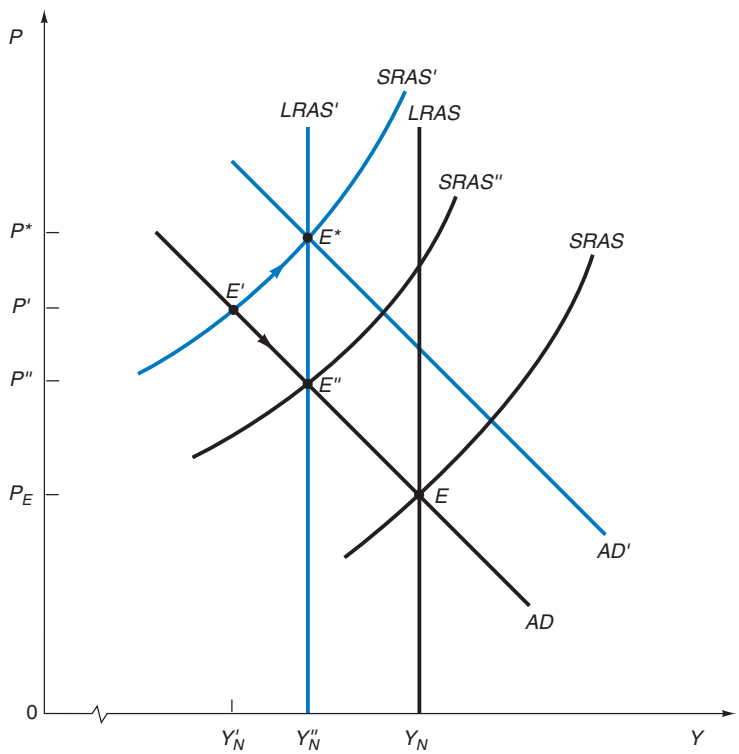

FIGURE 19.12. Macroeconomic Policies to Adjust to Supply Shocks.
From original long-run equilibrium point E, the increase in petroleum prices causes the *SRAS* curve to shift up to *SRAS'*, thus defining short-run equilibrium point E' at $P' > P_E$ and $Y'_N < Y_N$. Over time, prices fall because of recession, and the nation reaches new long-run equilibrium point E'' at the intersection of the *LRAS'*, *SRAS''*, and *AD* curves at $P'' < P'$ and $Y'_N > Y'_N$. An expansionary monetary policy that shifts the *AD* curve to the right to *AD'* would lead to alternative long-run equilibrium point E^* with $P^* > P'$ and Y''_N.

CASE STUDY 19-4 Petroleum Shocks and Stagflation in the United States

Figure 19.13 shows the inflation rate and the rate of unemployment in the United States from 1970 to 2011. The periods of stagflation (shaded in the figure), from the end of 1973 to the middle of 1975 and from the middle of 1979 to the end of 1982 with high inflation and high unemployment, are clearly associated with the two petroleum shocks. Since 1990, the rate of inflation in the United States has closely mirrored the price of petroleum, falling and rising together, while the rate of unemployment continued to fall from 1992 to 2000. The rate of unemployment then rose from 2000 to 2003, fell from 2003 to 2006, rose from 2007 to 2010 as a result of recession, and remained high in 2011 because of the slow recovery. The rate of unemployment remained relatively low up to 2007 and the rate of inflation until 2011, however, despite high petroleum prices.

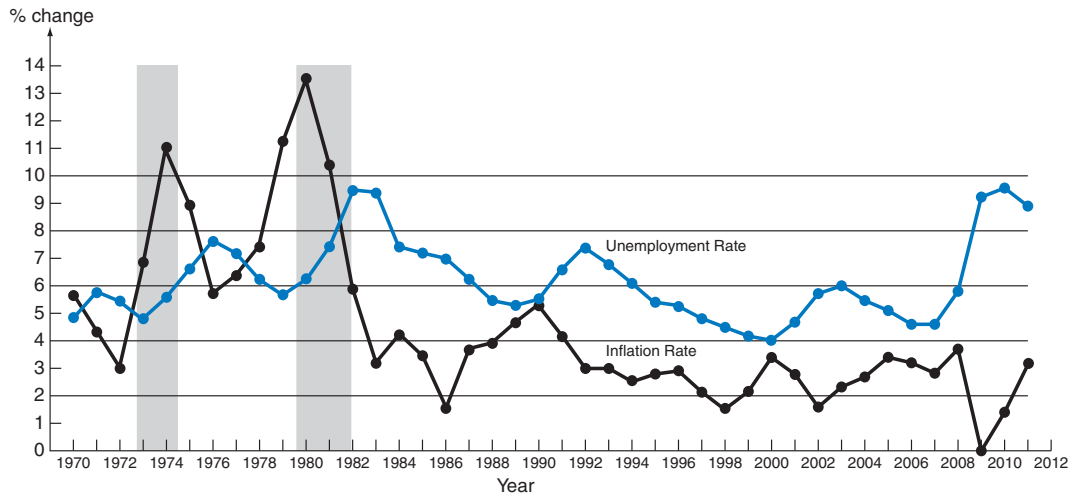

FIGURE 19.13. Stagflation in the United States, 1970–2011.
The shaded areas are periods of stagflation (recession and inflation) in the United States resulting from the two petroleum shocks.
Source: Organization Economic Cooperation and Development, *Economic Outlook* (Paris, various issues).

in petroleum prices is to shift the nation's short-run aggregate supply curve from $SRAS$ to, say, $SRAS'$, thus defining at the intersection of the $SRAS'$ and AD curves the new short-run equilibrium point E' with $P' > P_E$ and $Y'_N < Y_N$. The combination of recession or stagnation and higher prices or inflation at point E' is referred to as stagflation.

The lower level of natural output and employment at Y'_N, however, causes prices to fall, thus lowering costs and shifting the $SRAS'$ curve down and to the right, but not all the way back to $SRAS$. The reason is that long-run production costs have also increased as a result of the increase in petroleum prices, and so the $LRAS$ curve has also shifted to the left, say, to $LRAS'$. Thus, the new long-run equilibrium point E'' is obtained at the intersection of the $LRAS'$, $SRAS''$, and AD curves at $P'' < P'$ and $Y''_N > Y'_N$. At point E'', prices are higher and the natural level of output and employment is lower than at point E before the petroleum shock.

If, instead of waiting for prices to fall and eventually reach long-run equilibrium point E'', the nation used easy or expansionary monetary policy to shift the aggregate demand curve

from AD to AD' in order to speed up recovery from point E', the nation would move to equilibrium point E^* at the intersection of the $LRAS'$, $SRAS'$, and AD' curves, and prices would be even higher. Note that in either case the nation would not get back to the natural output level of Y_N that prevailed before the supply (petroleum) shock. Nations such as Italy and France that tried to use expansionary monetary policies to fight the stagflation that resulted from the petroleum shock of the 1970s ended up with much higher inflation rates than nations such as Germany and Japan that used *tight or contractionary* monetary policies to fight inflation, even in the face of recession. Case Study 19-4 clearly shows the two periods of stagflation (recession and inflation) in the United States that resulted from the two petroleum shocks. Case Study 19-5 shows the estimated impact of a $15 increase in the price of petroleum on the United States, Japan, the Euro Area, and all OECD countries. Case Study 19-6 extends the analysis to the relationship between the actual and the natural unemployment rates, on the one hand, and the rate of inflation, on the other, in the United States since 1980.

CASE STUDY 19-5 Impact of an Increase in the Price of Petroleum

Table 19.2 shows the estimated impact of a sustained or permanent $15 increase in the price of petroleum in the United States, the European Union (EMU), Japan, and in the OECD as whole in 2004 and 2005. The effects are measured as deviations from the baseline scenario and assuming constant interest rates. The table shows that a $15 sustained increase in the price of petroleum reduces the level of U.S. GDP by 0.15 percent (about one-seventh of 1 percent) in 2004 and by 0.35 percent in 2005 from what would have been the case without the increase in the price of petroleum. U.S. inflation would be higher by 0.70 percentage points in 2004 and 0.45 percentage points in 2005, while the U.S. current account deficit as a percentage of GDP would worsen by 0.30 percent in 2004 and 0.25 percent in 2005. The table shows that the impact on the EMU, Japan, and OECD is similar. Since the energy crises of the early 1970s and 1980s, industrial nations have become much more energy efficient and now require only half *as much* energy to produce each dollar of GDP than they did in the 1970s. This, together with the process of rapid globalization that has been taking place during the past three decades, has dampened the inflationary impact of increases in the price of petroleum.

TABLE 19.2. Estimated Impact of a $15 Increase in the Price of Petroleum on U.S., EMU, Japan, and OECD

	U.S.		EMU		Japan		OECD	
	2004	2005	2004	2005	2004	2005	2004	2005
GDP level	−0.15	−0.35	−0.20	−0.20	−0.35	−0.35	−0.20	−0.25
Inflation (percentage points)	0.70	0.45	0.65	0.30	0.40	0.15	0.65	0.35
Current account (% of GDP)	−0.30	−0.25	−0.40	−0.30	−0.30	−0.40	−0.15	−0.15

Source: Organization for Economic Cooperation and Development, *Economic Outlook* (Paris: December 2004), p. 135.

CASE STUDY 19-6 Actual and Natural Unemployment Rates and Inflation in the United States

Table 19.3 gives the actual unemployment rate and the inflation rate in the United States from 1980 to 2011. Until the mid-1990s, the natural unemployment rate was believed to be about 6 percent in the United States. Any rate of unemployment below 6 percent was supposed to trigger higher inflation. From the table we see that a higher unemployment rate was associated with a lower inflation rate in six of the 14 years from 1980 to 1993 (1982, 1987–1989, 1991–1992). From 1995 to 2007, however, the rate of unemployment fell below the natural level in the United States (except in 2003), but inflation remained very low and even declined in 1997–1998, 2001–2002, and 2006–2007. One explanation that has been given for this phenomenon is that because of the rapid globalization of the world economy, firms try to avoid increasing prices for fear of losing markets to foreign competitors, and workers refrain from demanding excessive wage increases for fear of losing their jobs. In other words, there seems to have occurred a structural change in the U.S. labor market that lowered the natural rate of unemployment from 6 percent in the 1980s to around 4 percent afterward.

Sources: "A Century of Booms and How They Ended," *The Wall Street Journal*, February 1, 2000, p. B1; "Sluggish U.S. Economy a Global Concern," *The New York Times*, September 27, 2002, p. 14; "On the Roll," *U.S. News and World Report*, January 12, 2004, pp. 32–39; C. Reinhart and K. Rogoff, "Is the 2007 U.S. Sub-Prime Financial Crisis So Different? An International Historical Comparison," *American Economic Review*, May 2008, pp. 339–344; and D. Salvatore, "The Global Financial Crisis: Predictions Causes, Effects, Policies, Reforms and Prospects," *Journal of Economic Asymmetries*, December 2010, pp. 1–20.

TABLE 19.3. Unemployment and Inflation Rates in the United States

Year	Unemployment Rate	Inflation Rate	Year	Unemployment Rate	Inflation Rate
1980	7.2	9.2	1996	5.4	2.9
1981	7.6	9.2	1997	4.9	2.3
1982	9.7	6.3	1998	4.5	1.5
1983	9.6	4.3	1999	4.2	2.2
1984	7.5	4.0	2000	4.0	3.4
1985	7.2	3.5	2001	4.8	2.8
1986	7.0	1.9	2002	5.8	1.6
1987	6.2	3.6	2003	6.0	2.3
1988	5.5	4.1	2004	5.5	2.7
1989	5.3	4.8	2005	5.1	3.4
1990	5.6	5.4	2006	4.6	3.2
1991	6.8	4.2	2007	4.6	2.9
1992	7.5	3.0	2008	5.8	3.8
1993	6.9	3.0	2009	9.3	−0.3
1994	6.1	2.6	2010	9.6	1.6
1995	5.6	2.8	2011	8.9	3.1

Source: Organization for Economic Cooperation and Development, *Economic Outlook* (Paris: OECD, May 2012).

SUMMARY

1. In our discussion of open-economy macroeconomics, we have generally assumed until now that prices remained constant as the economy expanded and contracted over the business cycle. In this chapter, we relax the assumption of constant prices and examine the short-run and long-run relationship between price and output in an open economy using an aggregate demand and aggregate supply framework that incorporates the effects of international trade and capital flows.

2. The aggregate demand (*AD*) curve is derived from the *IS*–*LM* curves of Chapter 18. The *AD* curve slopes downward, indicating that larger quantities of goods and services are demanded in the economy at lower prices. The long-run aggregate supply (*LRAS*) curve is independent of prices and is vertical at the nation's natural level of output, which depends on the availability of labor, capital, natural resources, and technology in the nation. The nation's output can temporarily deviate from its natural level (i.e., the nation's short-run aggregate supply (*SRAS*) curve is upward sloping) because of imperfect information or market imperfections. An unexpected increase in aggregate demand leads firms to temporarily increase their output. In the long run, however, as expected prices increase to match the increase in actual prices, the short-run aggregate supply curve shifts up by the amount of the price increase and defines a new long-run equilibrium point at the natural level of output but higher price level.

3. An increase of the price level in the nation causes a leftward shift in the *LM* curve because of the reduction in the real value of the nation's money supply. The *IS* curve shifts to the left because of the worsened trade balance, and the *BP* curve does the same because higher interest rates are now required to attract more international capital to compensate for the worsened trade balance. An increase in domestic prices thus reduces the aggregate quantity of goods and services demanded in the economy by more than if the economy were closed. The open-economy aggregate demand curve is even flatter or more elastic under flexible exchange rates because an increase in prices and worsened trade balance in the nation usually also lead to exchange rate changes and further trade balance effects.

4. Any change that affects the *IS, LM* , and *BP* curves can affect the nation's aggregate demand curve, depending on whether the nation operates under fixed or flexible exchange rates. An improvement in the nation's trade balance with constant domestic prices leads to a rightward shift in the nation's aggregate demand curve under fixed exchange rates but only to an appreciation of the nation's currency under flexible rates. An autonomous short-term capital inflow to or reduced outflow from the nation results in a rightward shift in the nation's aggregate demand curve under fixed exchange rates but to a leftward shift under flexible rates. Under highly elastic short-term international capital flows, fiscal policy is effective under fixed exchange rates, whereas monetary policy is ineffective. The opposite is true under flexible rates.

5. Expansionary fiscal policy under fixed exchange rates or monetary policy under flexible rates from a position of long-run equilibrium leads to an increase in prices but to only a temporary expansion in output. A nation could correct a recession with expansionary fiscal policy under fixed exchange rates and easy monetary policy under flexible rates but only at the expense of higher prices. In time, the recession would be automatically eliminated by falling prices, but this may take too long if prices are sticky and not too flexible downward. Nations with more independent central banks have had a better inflation performance than nations with less independent central banks.

6. Macroeconomic policies can also be used to achieve long-run growth. The *LRAS* and *SRAS* curves then shift to the right, reaching a larger level of natural output and employment and lower prices than with expansionary macroeconomic policies and no growth. The large supply shocks due to the sharp increases in petroleum prices during the 1970s caused the *SRAS* and *LRAS* curves of petroleum-importing countries to shift to the left because of increased production costs. It is less clear what happened to aggregate demand. The leftward shift in *SRAS* and *LRAS* curves led to recession and inflation (stagflation) in petroleum-importing countries. Nations that used expansionary monetary policies to fight stagflation generally faced even more inflation than nations that did not.

A LOOK AHEAD

The next chapter examines and compares the advantages and disadvantages of flexible versus fixed exchange rate systems with the objective of determining which type of system is "better." The evaluation will be conducted in terms of the degree of uncertainty arising under each system, the type of speculation that each system is likely to give rise to, the likely effect of each system on the rate of inflation, and the policy implications of each system. The conclusion will be reached that each system has some advantages and disadvantages and each may be more appropriate under different sets of circumstances. Chapter 20 also examines the European Monetary System (EMS) and macroeconomic policy coordination. Chapter 21 then deals with the operation of the entire international monetary system.

KEY TERMS

Aggregate demand (*AD*) curve, p. 618
Aggregate supply (*AS*) curve, p. 619
Expected prices, p. 622
Inflation targeting, p. 633
Long-run aggregate supply (*LRAS*) curve, p. 619
Natural level of output (Y_N), p. 619
Short-run aggregate supply (*SRAS*) curve, p. 620
Stagflation, p. 637

QUESTIONS FOR REVIEW

1. Why is it important to examine the relationship between prices and output in our analysis of open-economy macroeconomics? How are prices incorporated into the analysis of open-economy macroeconomics?
2. What does the aggregate demand curve in a closed economy show? How is it derived? Why is it downward sloping?
3. Why is a reduction in the general price level for a given money supply shown as a movement down a given aggregate demand curve, while an increase in the money supply for a given price level is shown as a shift in the aggregate demand curve?
4. How does an increase in government expenditures affect the *AD* curve? Why? To what kind of fiscal policy does this refer?
5. What does the aggregate supply curve show? How does the long-run aggregate supply curve differ from the short-run aggregate supply curve?
6. What is the natural level of output?
7. How can a nation's output temporarily deviate from its natural level? Why and how does a nation's output return to its long-run natural level?
8. Using an aggregate demand and an aggregate supply framework, explain why a nation must necessarily be in short-run equilibrium if it is in long-run equilibrium. How can the nation be in short-run equilibrium without being in long-run equilibrium?
9. How is an open economy's aggregate demand curve derived under fixed exchange rates? Why is this more elastic than if the nation were a closed economy?
10. Why must the Marshall–Lerner condition be satisfied for an open economy's aggregate demand curve to be more elastic than if the economy were closed?
11. How is an open economy's aggregate demand curve derived under flexible exchange rates? Why is this more elastic than if the nation were a closed economy or for an open economy with fixed exchange rates?
12. How does the effect of a real-sector shock on the nation's aggregate demand differ under fixed and flexible exchange rates?
13. How does the effect of a monetary shock on the nation's aggregate demand differ under fixed and flexible exchange rates from the case of a real-sector shock?
14. Why is fiscal policy effective but monetary policy ineffective under fixed exchange rates? Why is the opposite true under flexible rates?

PROBLEMS

1. Using an *IS–LM* diagram, show graphically how a reduction in the general price level in a nation results in a movement down the aggregate demand curve.

2. Using an *IS–LM* diagram, show graphically that for a given *LM* curve, the flatter is the *IS* curve, the flatter or more elastic is the aggregate demand curve.

3. Using an *IS–LM* diagram, show the effect of an easy monetary policy on the aggregate demand curve.

4. Using an *IS–LM* diagram, show the effect of an expansionary fiscal policy on the aggregate demand curve.

***5.** Explain why an unexpected increase in prices in the face of sticky wages (i.e., wages that do not immediately increase in the same proportion as prices) can explain an upward sloping short-run aggregate supply curve.

***6.** Suppose that the original long-run and short-run equilibrium in the economy of Figure 19.3 were at point *C* where the *AD′* curve crosses the *LRAS* and *SRAS′* curves. Explain why a downward shift in the aggregate demand curve from *AD′* to *AD* would result in a temporary reduction in output and a permanent reduction in price.

7. Explain in terms of labor market imperfections how a downward shift in the aggregate demand curve would result in a temporary reduction in output and a permanent reduction in price.

8. Explain how equilibrium in the goods and money markets and in the balance of payments would be reached if the *LM′* curve in the left panel of Figure 19.5 intersected the *IS′* curve below the *BP′* curve for an economy operating under fixed exchange rates.

9. Draw a figure similar to the left panel of Figure 19.6 showing how equilibrium in the goods and money markets and in the balance of payments would be reached if the *LM′* curve intersected the *IS′* curve below the *BP′* curve for an economy operating under flexible exchange rates.

10. Examine the effect on the nation's aggregate demand curve of an autonomous worsening of a nation's trade balance under fixed exchange rates.

11. Do the same as for Problem 10 for flexible exchange rates.

***12.** Explain why the usefulness of expansionary fiscal policy or easy monetary policy to correct a recession depends on how flexible domestic prices are downward.

13. With reference to Figure 19.12, determine what would happen if the monetary policy that shifts the nation's aggregate demand curve to the right to *AD′* in order to adjust to stagflation also leads to growth that keeps the nation's long-run aggregate supply curve at *LRAS* in the long run.

14. Is the concept of the natural rate of unemployment useful in view of the data presented in Case Study 19-5?

*= Answer provided at www.wiley.com/college/salvatore.

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