

CHAPTER 23

Fiscal and Monetary Policy Under Modern Financial Market Conditions

Two key macroeconomic aspects of modern international financial markets are the market determination of exchange rates among the major countries and high capital mobility. The first half of this chapter traces the implications of progressively higher degrees of capital mobility for a regime of freely floating exchange rates. The second half considers the extreme case of perfect capital mobility, thus reaching the logical extreme of the progression of cases considered earlier.

Equilibrium at a given exchange rate often entails a balance-of-payments surplus or deficit, but such disequilibria will eventually have to be corrected, if not by a deliberate change in government policy, then by an automatic mechanism of adjustment. In particular, if a country is running a balance-of-payments deficit, the central bank is losing reserves and will eventually have to allow the money supply to fall if it wishes to remain on a fixed exchange rate. We explored in Chapter 22 the implications of allowing money to flow out through the balance of payments. The alternative possibility is that instead of abandoning the money supply that it had previously set, the central bank abandons the exchange rate. In other words, the central bank can allow the currency to depreciate until the balance-of-payments deficit is eliminated. This will happen automatically if the country is on a floating exchange rate regime to begin with, as are the United States and most large industrialized countries.¹

What makes this analysis different from that in Section 18.1, where we first examined floating rates? We have now introduced capital mobility. In Chapter 22 we saw how capital mobility means that changes in the interest rate have implications for the capital account and therefore for the balance of payments. If the central bank follows a regime of sterilized intervention to keep both the exchange rate and money supply constant, then there are no further immediate implications for the level of income. However, the change in the balance of payments will itself have implications for the level of income, when either the money supply is allowed to change (as in the monetary approach to the balance of payments, previously considered) or when the exchange

¹A majority of continental European countries irrevocably fixed their exchange rates vis-à-vis each other in the European monetary union of 1999. As a unit they float against the dollar, yen, and Canadian dollar. Nonetheless, the floating rate model can be used to study changes in monetary or fiscal policy that the European countries all enact *jointly*. Other floating currencies include the Swiss franc, the pound, the Australian dollar, the Mexican peso, the Brazilian real, and the Chilean peso.

rate is allowed to change (as under floating exchange rates, to be considered now). In each case, the effect on the balance of payments derived at a given exchange rate holds the key to the effect on income under floating rates.

When the exchange rate is floating and the central bank does not intervene, the overall balance of payments, BP , is always zero. In algebraic terms, Equation 22.4 must hold continuously. In terms of the graphical apparatus derived previously, the economy must always be on the BP schedule. If a shock threatens to cause a move off it, the exchange rate will adjust automatically to shift the curve. As we have already seen, a devaluation, because it stimulates net exports, shifts the BP curve to the right, and a revaluation of the currency shifts it to the left. Under floating rates, whenever the economy is at a position that threatens to lie off the BP curve, the currency will instantly depreciate or appreciate to the degree necessary to eliminate the gap.

Recall that, although the balance of payments is always zero, this does not mean that the trade balance is necessarily zero. At any point in the upper part of the BP curve, the interest rate is attracting a capital inflow that is financing a trade deficit. In the lower part of the curve, there is a capital outflow offsetting a trade surplus.

23.1 Fiscal Policy Under Floating: An Effect Mitigated by Capital Mobility

We now consider a fiscal expansion, such as an increase in government expenditures or a cut in taxes. We begin with the case of no capital movements and then progress to higher degrees of capital mobility, just as in the case of fixed exchange rates.

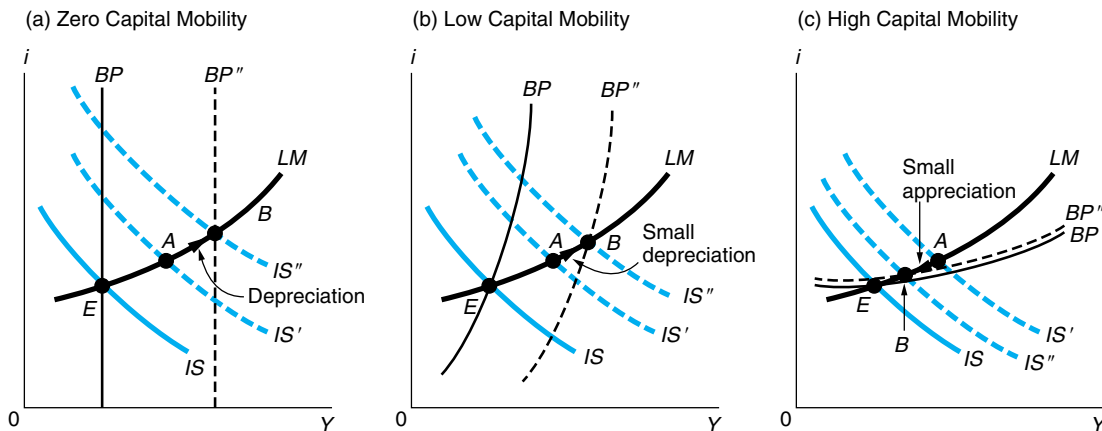
We saw in Figure 22.2(a) that the fiscal expansion shifts the IS curve out and raises income.² The higher level of imports produces a balance-of-payments deficit. This is point A in Figure 23.1(a). A situation that under fixed exchange rates produces a balance-of-payments deficit, under floating exchange rates automatically produces a depreciation of the currency. The depreciation stimulates the $\bar{X} - \bar{M}$ component of the trade balance, which we know causes both the BP curve (Equation 22.5) and the IS curve (Equation 22.2) to shift to the right. We also know that depreciation shifts the BP curve to the right faster than the IS curve. This is fortunate because, on the one hand, the economy is always at the intersection of the IS and LM curves and, on the other hand, the balance of payments will remain in deficit and the currency will have to keep depreciating as long as the economy is to the right of the BP curve. Eventually the depreciation will have shifted the BP curve sufficiently far to the right that it will catch up with the IS - LM intersection. Then all three curves will intersect at the same place, point B in Figure 23.1(a). Only there will the balance of payments be zero, as it must be under floating.

Because of the additional stimulus from depreciation, the fiscal expansion raises income by a greater amount under floating than under fixed exchange rates (B lies to the right of A). This is the same result obtained in Section 18.1 before the effect of the

²Recall from Chapter 18 that the increase in income at A is equal to the simple open economy multiplier, $\Delta \bar{G}/(s + m)$, minus an allowance for crowding-out of investment by the higher interest rate.

FIGURE 23.1**Fiscal Expansion Under Floating Exchange Rates**

A fiscal expansion shifts the IS curve to IS' , raising Y and i to A . (a) Without capital mobility, the trade deficit at A requires a depreciation, which stimulates net exports and thus further raises Y to B . (b) With low capital mobility, the balance-of-payments deficit is smaller at A , so the required depreciation and the further stimulus to Y at B are smaller. (c) With high capital mobility, the balance-of-payments is in surplus at A , so a small appreciation is required, which discourages net exports; thus the increase in Y at B is smaller than in the earlier cases.



interest rate on expenditure was introduced. It was described then as the result of floating exchange rates “bottling up” disturbances so that their full effect is felt in the country of origin.³

What changes with the introduction of capital mobility? As Figure 23.1(b) shows, the higher interest rate now attracts a capital inflow. There is an improvement in the capital account that partially offsets the deterioration in the trade balance. If the degree of capital mobility is relatively low, the net effect is still to worsen the overall balance of payments at a given exchange rate. Thus the effect under floating rates is again to depreciate the currency. The resulting stimulus to net exports again shifts both the BP and IS curves rightward until the BP curve catches up and all three curves intersect at the same point. Figure 23.1(b) shows this as a movement from A to B . As in Figure 23.1(a), the stimulus to income is greater under floating than under fixed rates. Introducing capital mobility, however, has made a difference. The capital inflow means that the potential balance-of-payments deficit that would exist if the exchange rate were to remain unchanged is smaller, and so the size of the needed depreciation is

³The effect on income is given by $\Delta\bar{G}/s$, minus an allowance for crowding-out by the higher interest rate, the same as it would be in a closed economy. A comparison with the preceding footnote shows that the effect is greater under floating rates. In the event of a liquidity trap, so that the LM curve is flat, income increases by the full amount of the rightward shift of the IS curve: $\Delta\bar{G}/(s+m)$ in the case of fixed rates, and $\Delta\bar{G}/s$ in the case of floating rates. The same would be true if the central bank were to follow a monetary policy of automatically accommodating changes in fiscal policy in such a way as to keep the interest rate unchanged.

smaller. Thus the rightward shift and the additional stimulus to output are not as great in Figure 23.1(b) as in 23.1(a).

With higher degrees of capital mobility comes the loss of *all* additional stimulus from floating rates. To see why, recall that under conditions of high capital mobility, the improvement of the capital account was more than enough to offset the deterioration of the trade balance. This lesson from Figure 22.2(c) is represented by point *A* in Figure 23.1(c). Under fixed exchange rates, the overall balance of payments actually went into surplus. This means that under floating exchange rates, the currency will *appreciate* to clear the balance of payments, not depreciate. The effect is to discourage net exports rather than to encourage them. The *BP* and *IS* curves shift left rather than right. The curves keep shifting until the *BP* schedule catches up with the *IS-LM* intersection and all three curves meet at a point, such as *B*, in Figure 23.1(c). The fiscal expansion has still increased income. However, the increase in income is not only less than it was under floating rates with no capital mobility, it is also less than it was under fixed exchange rates—because the foreign sector now enters negatively rather than positively.⁴

The finding is thus that under a regime of floating exchange rates capital mobility reduces the effectiveness of fiscal policy. This is exactly the opposite to that of the case under a regime of fixed exchange rates. We saw in our discussion of the monetary approach to the balance of payments that the higher the degree of capital mobility, the faster money comes into the country through the balance of payments to augment the effect of the fiscal expansion on income. Although capital mobility undermines fiscal policy under floating, it augments fiscal policy under fixed rates.

At *B* the economy is running a continuing trade deficit, financed by the capital inflow attracted by the higher interest rate. This is an equilibrium situation. There is no automatic monetary mechanism of adjustment because under floating exchange rates there are no changes in reserves, and so the question of whether the central bank sterilizes never even arises. (As much money flows in through the capital-account surplus as flows out through the current-account deficit.)

Effects of U.S. Budget Deficits in Recent Decades

The perfect illustration of this model is the great U.S. fiscal expansion undertaken by the Reagan administration in the form of its 1981–1983 tax cuts and simultaneous increases in defense spending. Between 1980 and 1985 there was an increase in the structural budget deficit equal to 3 percent of GDP. (Structural means that the increase in the deficit was not due to lower tax receipts arising from a fall in income, as happened in the 1981–1982, 1990–1991, and 2001 recessions.) As mentioned previously, this fiscal expansion was unusual not only in its magnitude but also in that it was not at all

⁴How do we know that under conditions of floating rates and high capital mobility the fiscal expansion still has a positive effect on income despite the loss in net exports? That is, how do we know that the three-curve intersection at *B* takes place to the right of starting point *E*? If the currency appreciation were so great that the *IS* curve shifted as far back to the left as *E*, then the balance of payments would pass into deficit because *i* and *Y* would be unchanged, leaving only the negative effect of the appreciation. For the overall balance of payments to be in equilibrium, the appreciation has to stop while there is still some surplus left on the capital account, that is, with *i* higher than at the starting point.

accommodated by monetary policy. The Federal Reserve, having undertaken a commitment in 1979 to restrict monetary growth in order to fight inflation, allowed interest rates to rise sharply. From 1979 to mid-1982, the short-term interest rate rose by 2 percent and the long-term interest rate by 5 percent. Just as the model predicts, the higher interest rates attracted a large capital inflow from abroad and caused a large appreciation of the dollar.

International investors care not only about nominal interest rates in various currencies but also about expectations as to how much the currency is going to be worth in the future. Chapter 27 will add expectations to the model. For now, it is important to realize that a domestic firm's decision whether or not to undertake investment in plant and equipment depends not on the nominal interest rate, but on the *real* interest rate, that is, the interest rate adjusted for expected inflation. Nominal interest rates began to decline in mid-1982 when the Federal Reserve began to ease up slightly on monetary growth. Yet expected inflation was declining more rapidly. In other words, real interest rates remained high after 1982.⁵

Between 1980 and 1984 the dollar appreciated by 58 percent against a weighted average of other currencies.⁶ As we saw in the discussion of the J-curve in Chapter 16, a change in the exchange rate actually takes several years to have its effect on net exports. The U.S. trade deficit hit a then-record level in 1983, and it continued to mount steadily thereafter, peaking in 1987. Imports, in particular, increased rapidly. Part of the increase in imports could be explained by the growth in income in those years, but much of it was related to the high value of the dollar making other countries' goods cheaper than U.S. goods. Both the income effect and the exchange rate effect are precisely what is predicted from a fiscal expansion in Figure 23.1(c).

There is a neat way of summing up the effects of a fiscal expansion under modern conditions: In addition to crowding out investment (and other components of expenditure coming from the domestic sector) via higher real interest rates, the fiscal expansion also crowds out net exports (expenditure coming from the international sector) via a higher value of the currency.

The general principle can be seen from the national saving identity derived in Chapter 17:

$$S + T - G \equiv I + CA$$

Private saving, S , plus public saving, $T - G$, is equal to investment in the stock of physical capital, I , plus the accumulation of claims against foreigners through the current-account balance, CA . As a matter of accounting this equation must hold at all times, regardless of how its components are determined and what happens to interest and

⁵Real interest rates among other major industrialized countries rose also, but not by as much, on average, as in the United States. Various measures of the long-term real interest *differential* show a peak in 1984 of about 4 percent, as compared to approximately zero in 1980.

⁶This is the appreciation in nominal terms. The appreciation in real terms was 52 percent. (The source is the Federal Reserve Board's index with multilateral trade weights. Consumer price indices (CPIs) are used for the real exchange rate.) The small difference between these numbers means that very little of the change in the exchange rate was offset by changes in the countries' price levels. In other words, the Keynesian assumption appears justified: To analyze the effects of changes in policy, prices can be taken as given in the relatively short run.

exchange rates. Table 17.1 presents the relevant numbers for recent U.S. history. The federal budget, shown in column 4, ran a deficit of about 3 percent of GDP during the 1980s and early 1990s; government saving was negative. The private saving rate (column 1) did not rise. Thus, much of private saving, S , went to finance the budget deficit. Total net national saving (shown in column 5) fell from 9 percent of GDP in the 1970s, to 4 or 5 percent of GDP in the late 1980s and early 1990s.⁷ This low level of domestically available funds was not enough to finance investment in plant and equipment, let alone to undertake any net lending overseas.

The national saving identity says that as a simple matter of arithmetic, when there is a fall in national saving, there must be a fall in investment, I , a fall in the current-account balance CA (which is also an increase in borrowing from abroad), or some combination of the two. In a closed economy, all the burden of the crowding-out caused by a fiscal expansion must fall on investment. This principle had some relevance for the United States in earlier decades and has some relevance for some other countries even today. However, as a consequence of the high degree of capital mobility in the United States today, much of the burden of the crowding-out instead falls on net exports. Investment in the late 1980s and early 1990s as a share of GDP was down about 3 percentage points from the level of the 1970s. This means that the 5-point fall in national saving was reflected partly as a fall in investment, but partly as a net capital inflow, as seen in Table 17.1. and Figure 23.2.⁸

A current-account deficit, when viewed from its more flattering profile, is the same thing as a capital inflow. It makes sense that a decision by the government to run a deficit, that is, to borrow—if it is not offset by the actions of domestic residents—is reflected in a deficit for the country as a whole, that is, national borrowing from the rest of the world. In an economic sense, it is as if foreign investors were financing the U.S. budget deficit. This is the famous problem of the *twin deficits*—budget deficit and trade deficit.

In the 1990s the federal government got its finances under control. Tax increases and caps on real expenditure were enacted toward the beginning of the decade and gradually paid off. By 1998 the budget deficit had been eliminated, and rising surpluses followed, as column (3) in Table 17.1 shows. The idea of the twin deficits would lead us to expect that the elimination of the budget deficit was matched by the elimination of the trade deficit. Instead, the trade deficit reached new highs. Why?

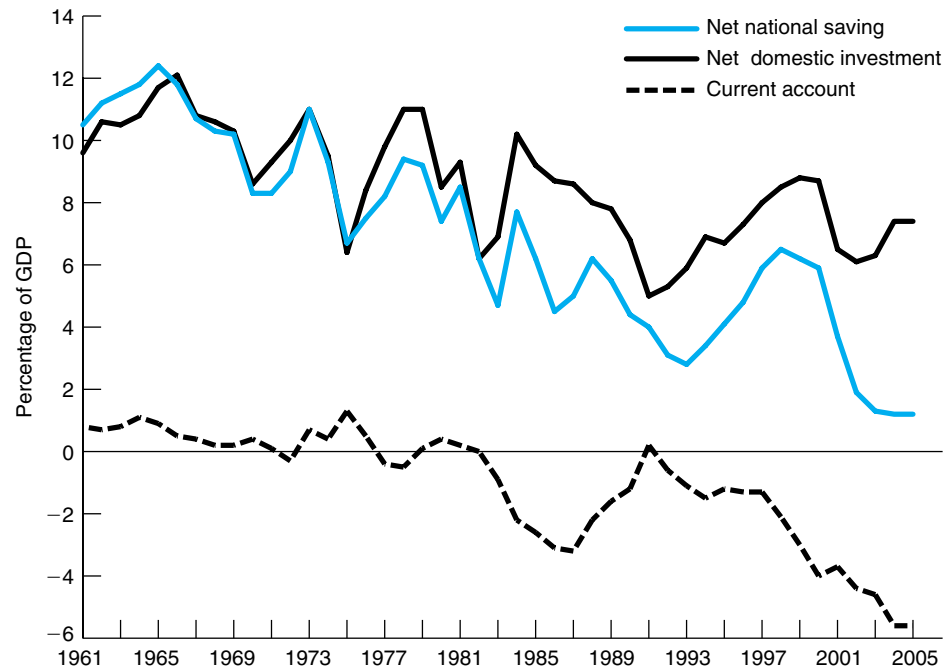
At the same time that the public sector was moving toward record surpluses, the private sector was moving toward record deficits. The U.S. economic expansion that began in 1992 and continued strong to 2000—the longest lasting on record—was led by a boom in private domestic demand. (In terms of the Mundell-Fleming models, the IS curve in the 1990s shifted out because of an expansion of private demand, not an expansion of public demand as in the expansions of the 1960s, 1970s, and 1980s.) The boom took the form of rapid increases in consumer expenditures and business invest-

⁷When the term *net* is applied to national saving, investment, or output, it means net of the depreciation of the capital stock. The country must devote a certain amount of saving and investment each year to replace worn-out old machines and buildings before it can start increasing the size of the capital stock.

⁸The last section of the appendix to Chapter 21 discusses the saving-retention coefficient, which answers the following question: For a given exogenous change in national saving, how much is retained domestically, that is, is reflected as a change in investment, and how much is reflected as a change in borrowing from abroad?

FIGURE 23.2

National Saving, Investment, and Current Account as Shares of GDP



ment in equipment and software. These increases, in turn, were probably attributable to soaring wealth in the stock market and to new opportunities in information technology, both being components of what was called the “new economy.” Whatever the origins, it is clear that U.S. investment increased more rapidly than national saving. The difference was the widening current account deficit. The United States continued to borrow from abroad, but now to finance private sector deficits rather than public sector deficits.

The years 2001 to 2005 saw a return to the 1980s pattern of large budget deficits arising from both large tax cuts and rapid increases in spending, together with low private saving. Thus net national saving as a share of GDP fell even below the earlier record lows, as Figure 23.2 shows. The result was the return of the twin deficits: the U.S. current account reached record levels—over 6 percent of GDP in 2005.⁹

⁹In some other respects, the policy mix launched under the Bush administration in 2001 differed strikingly from the Reaganomics mix. Monetary policy was accommodating, interest rates were low, and the dollar, if anything, depreciated. In terms of the Mundell-Fleming model, when Reagan shifted out the *IS* curve in the early 1980s, Fed chairman Paul Volcker kept the *LM* curve firmly in place whereas when President George W. Bush shifted out the *IS* curve in the early 2000s, Chairman Alan Greenspan shifted the *LM* curve out as well. In this respect, the 2002–2003 period was more reminiscent of the Vietnam expansion of the late 1960s, under Presidents Johnson and Nixon, than of the Reagan period. In 2005–2006, however, the Fed raised U.S. interest rates back above European interest rates, thus returning toward the mix of tight money and loose fiscal policy.

Imagine that the capital inflow of the 1980s, 1990s, and 2000s had somehow been prevented. Imagine, for example, that the government had been willing and able to impose effective capital controls (which is unlikely). Then the trade deficit would not have deteriorated so much. This sounds like a favorable effect; but investment would have been at a lower level because interest rates would have been forced up. The burden of crowding-out simply would have been redistributed from net exports to investment. Producers who rely on foreign customers would have been helped, but sectors sensitive to interest rates would have been hurt. Examples of industries sensitive to net foreign demand include agriculture, semiconductors, textiles, and scientific instruments. An example of an industry that is sensitive to interest rates is construction. Many industries, such as autos, aircraft, earth-moving equipment, and other capital goods, are sensitive to both, and so lose either way. (For them, the desired policy is a strong budget surplus and national saving.)

23.2 Monetary Policy Under Floating: An Effect Enhanced by Capital Mobility

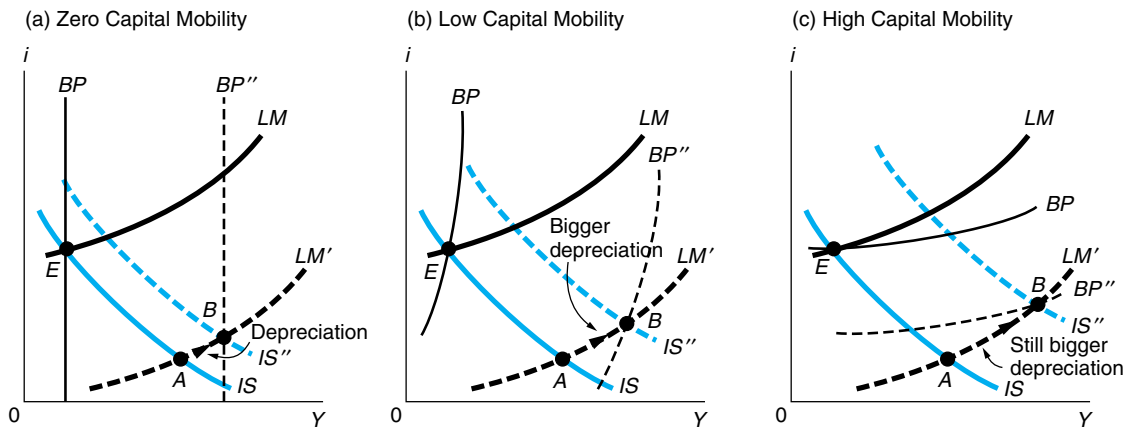
We now consider the effects of a monetary expansion, for progressively greater degrees of capital mobility. We have already seen what happens with a given exchange rate when an increase in the money supply shifts the LM curve to the right: The higher level of income leads to a trade deficit and also to a deficit in the overall balance of payments. The equilibrium was represented by point M in Figure 23.3(a), which becomes point A in Figure 23.3(a). When the experiment is translated to the case of floating rates, the currency must depreciate to eliminate the deficit. The depreciation stimulates net exports (relative to what they would be at point A , not relative to what they were at point E before the expansion raised income and therefore imports). It thus shifts the BP and IS curves to the right, until all three curves intersect at the same point. With no capital mobility, this is point B in Figure 23.3(a). The monetary expansion stimulates income by more under floating exchange rates than under fixed exchange rates. (Point B lies to the right of A .)

What difference does the introduction of capital mobility make in this context? Figure 23.3(b) illustrates the case of partial capital mobility. Again there is a deficit at a given exchange rate, point A , implying a depreciation, a rightward shift of the BP and IS curves, and further stimulus to income. The only difference arises from the capital outflow in response to the fall of the domestic interest rate below the foreign level. The overall balance of payments at point B in Figure 23.3(b) is larger than in Figure 23.3(a), where there was only a deficit on the *trade* account to contend with. This implies that the depreciation of the currency must be even greater if it is to equilibrate the balance of payments. Thus the stimulus to net exports, and therefore to income, is even greater. Indeed, the depreciation is sufficiently great that the trade balance is in surplus at B despite the increase in income. The surplus on the current account is just offset by the deficit on the capital account resulting because the interest rate at B is still lower than it was at starting point E . The bottom line is that capital mobility enhances the effec-

FIGURE 23.3

Monetary Expansion Under Floating Rates

A monetary expansion shifts the LM curve out to LM' , lowering i and raising Y . (a) Even without capital mobility, the trade deficit at A requires a depreciation, which further raises Y at B . (b) With some capital mobility, the balance of payments deficit is larger at A ; this requires a larger depreciation, which raises Y even further at B . (c) With high capital mobility, the deficit at A , depreciation, and stimulus at B are all larger still.



tiveness of monetary policy. In addition to the usual route of stimulating investment and other components of domestic demand via lower interest rates, the expansion also stimulates foreign demand via a lower value for the currency.¹⁰

Now we progress to the case of high capital mobility in Figure 23.3(c). The story is similar. However, there is an even greater capital outflow in response to the same decline in the interest rate. Thus the depreciation of the currency and the further stimulus to net exports, and therefore to income at B , are even greater than in the case of lower capital mobility. Notice that as a consequence of the high degree of capital mobility, the interest rate does not fall as far below the foreign interest rate as before. This means that the stimulus to investment is not as large as before. When capital mobility is sufficiently high, more of the stimulus comes from net exports than from domestic demand.¹¹

¹⁰This Mundell-Fleming result that a monetary expansion gives rise to a capital outflow (and corresponding current-account surplus) is based on the assumption that capital flows depend only on interest rate differentials. When capital flows are allowed to depend also on exchange rate expectations, as in Chapter 27, this result need not hold.

¹¹The rightward shifts of the BP and IS curves in Figure 23.3(c) are so great that one might wonder whether the interest rate, i , at B is still lower than at E . The answer is that it is. To see this, imagine what would happen if i returned to its original level. Then the capital account, KA , would still be at its original level, which implies that the trade balance, TB , would still be at its original level ($TB = -KA$). So would investment, I . Yet total output, Y , has increased, which cannot happen if there is no reason for any of its components, $C + I + G + TB$, to increase. To stimulate I and TB , i must be lower.

The main result is that the effectiveness of monetary policy at changing output is enhanced the greater the degree of capital mobility. Notice that this is just the opposite of the result obtained from the monetary approach to the balance of payments under fixed exchange rates. When the central bank chooses to keep the exchange rate fixed, high capital mobility means that any given expansion in domestic credit simply flows out through the balance of payments that much faster. When the country chooses to keep the money supply fixed and instead let the exchange rate adjust, high capital mobility means that any given expansion has an extra impact via depreciation. This is one reason why a country where the financial markets have become more developed and more integrated into world markets may opt to switch from a fixed exchange rate regime to a floating rate, assuming that it wishes to be able to pursue an independent monetary policy.

The results for monetary policy are also just the opposite of the results for fiscal policy. The key to the differences is the reaction of the interest rate. A monetary expansion operates by *lowering* the interest rate, causing capital to *flow out* of the country. This effect subtracts from the income expansion in the case of fixed rates, but enhances it when the exchange rate is allowed to change. A fiscal expansion, in contrast, operates by *raising* the interest rate and attracting a capital *inflow*. Thus the effects are the opposite of those achieved with monetary policy: They add to the income expansion in the case of fixed rates and subtract from it in the case of floating rates.

Three Examples of Powerful Monetary Contractions

The way that changes in monetary policy operate in a modern, floating rate, mobile-capital economy is illustrated by developments at the end of the 1970s in the United States. By 1979 public exasperation with inflation had become sufficiently great that there was something of a consensus that the top priority should be bringing inflation down, even if the cost might be a recession. The Federal Reserve Board under Chairman Paul Volcker tightened monetary policy. Interest rates shot up in 1980, and the contractionary effects in investment and other components of spending were soon felt in the 1980 and 1981–1982 recessions. The unemployment rate reached a postwar high in 1982. One reason why the recession was more severe than many expected and why the inflation rate came down more rapidly than many expected was the strong appreciation of the dollar that began in 1980. This chapter has already discussed the role of the fiscal expansion in driving up interest rates and the value of the dollar in the early 1980s. Many observers think that the monetary contraction was the origin of the 1980–1982 phase of this process. As in the model just developed, a leftward shift of the *LM* curve raises interest rates, attracts capital from abroad, appreciates the currency, and worsens the trade balance. Thus the brunt of the recession is borne by exchange-rate-sensitive industries in addition to interest-rate-sensitive industries.

The expansion that began in 1983 eventually returned the economy to the same position in the business cycle as before the recession. Because its origin was a fiscal expansion, real interest rates remained high. Comparing 1985 to 1980, the net policy change was neither contraction nor expansion, but rather a shift in the *mix* of monetary and fiscal policy. The mid-1980s mix implied high real interest rates and a high real

value for the dollar. As a consequence, the composition of GDP featured higher shares for C and G at the expense of lower shares for I and $X - M$.¹²

A similar sequence of events occurred in the United Kingdom. When Margaret Thatcher became prime minister in 1979, she imposed tight monetary targets. The pound appreciated sharply (although this may have been related as much to an increase in North Sea oil wealth as to the tight money policy). British firms that had been dependent on export demand or that competed directly with imports, particularly in manufacturing, were hit very hard as a consequence of their loss in international competitiveness. The resulting decline in this sector was labeled “deindustrialization.” Unemployment rose steadily (from 5 percent in 1979 to 12 percent in 1982), although, as in the United States, the benefit of lower inflation did eventually arrive. The point again is that exchange rate effects enhance the impact of changes in monetary policy, for better or for worse.¹³

Yet another example is Japan. In 1988–1989, the Bank of Japan followed an expansionary monetary policy, buying dollars to support the value of the U.S. currency against the yen and keeping real interest rates low in Japan. The result was what has become known as the bubble economy: strong growth coupled with soaring prices in the equity and real estate markets. During the 1990–1992 period, the Bank of Japan reversed policy and raised interest rates sharply. This move succeeded in its intended purpose, which was to burst the financial bubble. It also had the effect, however, of setting in motion a new upsurge in the value of the yen and a serious recession in Japan. As a result of *endaka* (the strong yen), previously invincible exporters found themselves in 1995 with prices that were no longer competitive on world markets. Monetary policy still has strong effects on the economy.

23.3 Policy Under Perfect Capital Mobility

Chapter 21 showed that transaction costs, capital controls, and other barriers that can separate international investors from the portfolios they wish to hold are close to negligible among most of the large industrialized countries. Thus the degree of capital mobility is not just high, but close to infinite. The parameter k in Equation 22.1, the responsiveness of capital flows to rates of return, is close to infinite. This case is the natural limit of the logical progression—zero, low, and high capital mobility—that we have

¹²Given total GDP, what would be the point in altering its composition through such a monetary/fiscal policy mix? An advantage is that the strong dollar, by lowering import prices, helped bring inflation down faster than would otherwise have been the case. But there are a number of disadvantages, especially in terms of longer-run consequences. In the first place, when investment is crowded out today, it means that the capital stock will be lower in the future, and so real growth is lower in the long run. Second, net exports are crowded out. This gives rise to strong protectionist pressures from the adversely affected sectors, which can have damaging effects on the efficiency of the economy. Furthermore, when the country runs a current-account deficit, it means that it is borrowing from abroad. As a result, the country will be poorer in the future and at the mercy of foreign creditors.

¹³British macroeconomic policy from 1979 to 1981 is described by Willem Buiter and Marcus Miller in “Changing the Rules: Economic Consequences of the Thatcher Regime,” *Brookings Papers on Economic Activity*, no. 2 (1983): 305–379.

been considering. One advantage of studying the polar case of perfect capital mobility is that the relative effects of monetary policy and fiscal policy are sharpened; the results stand out quite clearly, whereas in the case of partial capital mobility the graphs can be messy, as the reader no doubt noticed.

Recall that the slope of the BP curve is m/k . As k goes to infinity, the slope goes to zero. In other words, the BP curve becomes flat. The flat line is drawn at the level of the home interest rate, i , that is equal to the world rate, i^* . If i were to rise above i^* , even for just an instant, the differential would immediately attract a very large capital inflow. All foreign investors would want to acquire the better-paying assets in the home country rather than those in their own country; domestic residents would seek to borrow at the cheaper rate abroad. Such capital flows will arbitrage away the interest differential, that is, will keep it from opening up to begin with. Thus, another way of saying that k is infinite is to say that $i - i^*$ is always zero, as is clear from Equation 22.5.

Fixed Exchange Rates and Perfect Capital Mobility

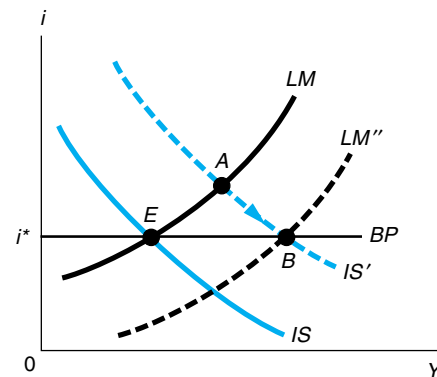
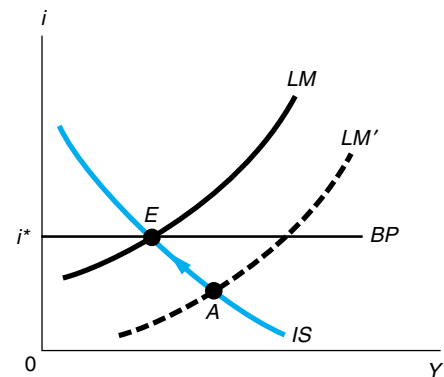
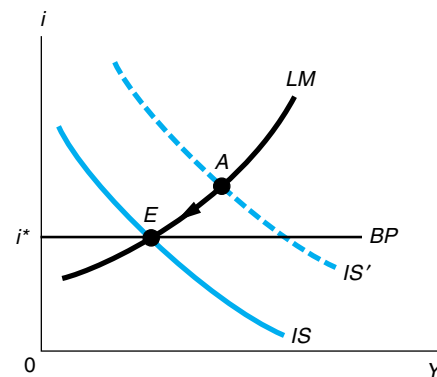
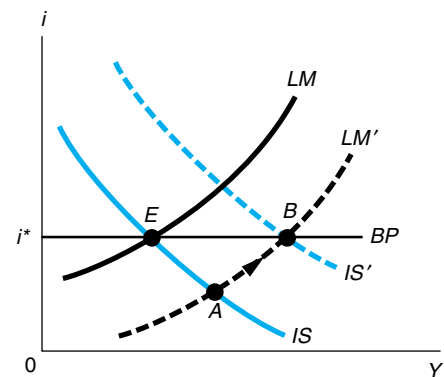
We return briefly to the case of fixed rates, beginning with a fiscal expansion. In Figure 23.4(a) the IS curve once again shifts right. The increase in the demand for money drives up the interest rate to point A as usual, attracting a large capital inflow. More precisely, *if* the economy could remain at A , then the higher interest rate *would* attract a capital inflow, and the central bank would have to make the usual decision under fixed rates as to whether to sterilize it. The potential inflow, however, is so large that the central bank has no option. There is no limit to the quantity of foreign exchange it would have to buy up in return for domestic currency until it exhausted its holdings of domestic assets. (In the case of a fiscal contraction that lowers the interest rate, there is no limit to the quantity of foreign exchange the central bank would have to supply in exchange for domestic currency until it exhausted its holdings of foreign assets.) If the central bank does not wish to abandon the exchange rate peg, it will have to abandon its money supply target: It must allow the inflow of reserves through the capital account to swell the domestic money supply. The increase in the money supply will shift the LM curve to the right, to LM'' in Figure 23.4(a). The shift must be great enough that the intersection with the new IS' curve, at point B , is on the BP line. Only then will the interest rate, i , be back at level i^* , as it must be if the capital inflow is not to be infinite.

Income is much higher at point B than at A .¹⁴ The case of perfect capital mobility is the limit of the progression of cases illustrated in Figures 22.2(a), 22.2(b), and 22.2(c). With high capital mobility, the effect of the fiscal expansion on income is supplemented by an increase in the money supply in the long run. With infinite capital

¹⁴Indeed, the increase in income is the full Keynesian multiplier effect, without any of the usual crowding-out from a higher interest rate. An increase in government spending, ΔG , always shifts the IS curve to the right by $\Delta G/(s + m)$. Usually the final effect on income is less because the economy is at a point like A . However, when capital mobility is so high that it prevents the interest rate from rising, income increases by the full amount of the rightward shift. In this case, international capital flows have the same effect as an automatically accommodating monetary policy.

FIGURE 23.4**Perfect Capital Mobility**

When capital mobility ties i to the world interest rate i^* , the BP schedule is flat. The potentially infinite capital inflow that would result from a fiscal expansion to A means that (a) under fixed rates, the reserve inflow must be large enough to shift the LM curve instantaneously all the way out to B , or (b) under floating rates, the appreciation must be large enough to return the IS curve all the way back to E . The potentially infinite capital outflow that would result from a monetary expansion means that (c) under fixed rates, the reserve outflow must be large enough to return the LM curve all the way back to E , or (d) under floating rates, the depreciation must be large enough to shift the IS curve all the way out to B .

(a) Fiscal Expansion, Fixed Rates**(c) Monetary Expansion, Fixed Rates****(b) Fiscal Expansion, Floating Rates****(d) Monetary Expansion, Floating Rates**

mobility, the effect is even stronger in that (1) the money flows in instantaneously, whether the central bank attempts to sterilize it or not, and (2) the increase in the money supply is greater.

We now consider a monetary expansion. In Figure 23.4(c), the increase in the money supply shifts the LM curve rightward to LM' and drives down the interest rate.

The lower interest rate at point A gives rise to a capital outflow. More precisely, the interest rate *would* fall if the economy could remain at point A . Yet there is no limit to the potential magnitude of the capital outflow. If the central bank tries to maintain both its exchange rate target and its new money supply target, it will rapidly exhaust its entire stock of foreign exchange reserves. If it chooses to stay with the fixed exchange rate, it will be forced to give up its money supply target and allow the outflow of reserves through the capital account to reduce the money supply. The reduction in the money supply immediately shifts the LM curve back to the left until it returns to the original LM curve. Only when the money supply is back to its preexpansion level at point E will the interest rate have returned to the world level; only then will domestic investors stop pumping capital out of the country. At point E there is no effect on income at all.

Again, this case is the limit in the progression illustrated in Figure 22.3(a), 22.3(b), and 22.3(c). Under the monetary approach to the balance of payments, any increase in the money supply eventually flows back out through the balance of payments when the central bank decides to give up the attempt to sterilize the outflow, with the process proceeding more rapidly the higher the degree of capital mobility. In the case of perfect capital mobility, the central bank could not sterilize the outflow even if it wanted to and even in the short run. Thus, the expansion in income does not actually take place even in the short run. Point A is purely a hypothetical location.

Even though Figure 23.4(c) looks precisely the same after the monetary expansion as before, one detail has changed. Recall that the total money supply is given by international reserves plus domestic credit. When the central bank increased the money supply, it did so by increasing the supply of domestic credit, that is, its holdings of net domestic assets. (In the United States, this would normally mean purchasing Treasury securities.) When the money flowed back out, it was international reserves that were lost. Thus the *composition* of the monetary base has been permanently altered, as between net domestic assets and international reserves.

Notice incidentally that besides being flat, the BP schedule has a subtly different interpretation under perfect capital mobility, as does its algebraic representation, Equation 22.5. When capital mobility is less than complete, the BP schedule is the set of points for which the balance of payments is zero. When capital mobility is infinite, however, the BP schedule is the set of points for which the balance of payments is neither plus infinity nor minus infinity. This is just another way of saying that the economy must always be on the BP schedule: i is tied to i^* . It also means that, given that the economy is on the schedule, neither the net capital flow nor the overall balance of payments can be determined. They will not necessarily be zero.

Our conclusions are quite striking. In a regime of fixed exchange rates, fiscal policy reaches its peak effectiveness under perfect capital mobility, but monetary policy *loses* all effectiveness under perfect capital mobility. In both cases, the key to the conclusion is that potentially infinite capital flows prevent the interest rate from deviating from the world level. In both cases, the IS curve alone determines the level of income. Attempts to shift the LM curve by increasing domestic credit have no effect because the money simply flows out of the country as fast as it is created.

The Impossible Trinity, and the Example of European Monetary Integration

There follows from our results a simple rule applicable to programs of economic integration like that undertaken by the countries of Europe. *Of the Impossible Trinity—fixed exchange rates, financial openness, and monetary independence—a country can choose to have any two attributes, but it cannot choose all three.*

The European Monetary System was formed in 1979 by Germany, France, Italy, and other members of the European Economic Community seeking to stabilize their exchange rates. Initially, France and Italy retained a degree of ability to use monetary policy independently. This independence was not entirely inconsistent with exchange rate stability because they retained capital controls.

However, in the late 1980s France and Italy removed those controls, as we have seen. Simultaneously, they sought to achieve greater exchange rate stability. Spain joined the Exchange Rate Mechanism in 1989, and Britain in 1990. Spain joined the others in freeing capital controls in 1991.

This combination of fixed exchange rates and financial integration put European countries in the category of economy described by Figure 23.4(c). We have seen that under these conditions, with both the exchange rate and the interest rate tied down, monetary policy is powerless to affect the level of economic activity within the country. The lesson is that France, Italy, and the other individual countries of Europe had to be prepared politically for the loss of their monetary independence, or the plan for exchange rate fixity with full financial integration would not be successful.

European politicians find the principle of economic integration very attractive. In December 1991 an EC summit meeting at Maastricht in the Netherlands affirmed the members' political commitment to the European Economic and Monetary Union (EMU). They agreed on plans for renouncing exchange rate realignments (the discrete changes in the midpoint of the range that had occurred periodically from 1979 to 1987), narrowing the margins (which had been at plus or minus 2¼ percent for most members), and eventually adopting a single currency (now called the euro) by 1999.

The commitment was soon tested by increases in German interest rates. As we saw in Section 22.2, the Germans had recently increased government spending and investment in connection with unification with East Germany. At the same time, the Bundesbank had its own reasons for maintaining monetary discipline. It wished to head off inflation. At a time of slowdown in worldwide economic growth, however, Germany's partners in the EMS would not have chosen of their own volition the higher interest rates that were produced by the German monetary/fiscal policy mix.

The Maastricht Treaty was to be ratified in 1992 by the individual member countries. At first, the political leaders assumed that their populations and parliaments would readily approve the plans for the EMU. But as dates for the referenda drew near, popular opposition began to mobilize. Those opposed feared a loss of economic sovereignty under the treaty in general, and they particularly disliked the high interest rates that Germany was forcing on them at the time.

The trigger for the subsequent crisis was a (narrow) rejection of the treaty by Danish voters, followed by polls indicating that the same outcome was possible in France. Meanwhile, the Bundesbank turned down requests, particularly from the British, for lower interest rates. It began to look like the political leaders had made commitments that implied a greater loss of monetary sovereignty than their populations were willing to accept. Speculators in the foreign exchange market, anticipating an imminent unraveling of the European Monetary System, began to sell the currencies of those countries where popular opposition to high interest rates seemed to be greatest, and to buy deutschmarks. The massive selling pressure was too intense for the central banks who were trying to defend the parities. In September 1992 the speculators won out. Italy and the United Kingdom were forced to drop out of the Exchange Rate Mechanism (ERM) altogether, that is, to allow their currencies to float. Spain and Portugal chose to remain in, but they had to devalue. After a similar crisis in August 1993, France was forced to widen its bands to 15 percent. These developments were precisely the opposite from what had been anticipated under the plans for the EMU.

The ERM crises of 1992–1993 illustrate the principle of the Impossible Trinity. Faced with a hard choice among sacrifice of monetary sovereignty, sacrifice of fixed exchange rates, or sacrifice of open capital markets, only a few countries like the Netherlands ultimately turned out to be truly prepared to give up all monetary sovereignty at that time. Italy and the United Kingdom gave up fixed exchange rates instead. Spain gave up open capital markets, temporarily reimposing control on capital outflows.

Later in the decade, commitment to the Maastricht Treaty grew beyond question. The EMU successfully took effect among eleven qualifying countries in 1999. (A twelfth, Greece, joined in 2000.) Exchange rates among the members are now “irrevocably fixed.” Indeed, the central banks of participating European countries have no ability to undertake independent monetary policy. Rather, they function merely as branches of the European System of Central Banks, much as do the district banks of the Federal Reserve System in the United States. This abandonment of monetary independence and even of national currencies is historically unprecedented among major sovereign countries. Strains are already evident. The interest rate appropriate for Italy does not suit Ireland and vice versa. Some Italian politicians have expressed second thoughts. Those members of the European Union that have not yet joined the EMU will have a hard time deciding whether to take the plunge (the United Kingdom, Sweden, and Denmark, plus ten countries, mostly in Central Europe, that joined the EU in 2005).

Floating Exchange Rates and Perfect Capital Mobility

So far the conclusion has been that when capital is perfectly mobile, the central bank has to abandon its money supply target *if* it does not wish to abandon its exchange rate target. What if the monetary authorities respond to the potentially limitless inflow of reserves (which comes, for example, with an increase in interest rates) by allowing the currency to appreciate? What if they respond to the potentially limitless outflow of reserves (which comes, for example, with a decrease in interest rates) by allowing the

currency to depreciate? This is the case of floating exchange rates, with which we now conclude the taxonomy of cases. Floating rates allow the country to recapture its monetary independence despite perfect capital mobility. The LM curve will shift when the domestic central bank deliberately decides to change monetary policy and *only* when it decides to do so.

Figure 23.4(b) illustrates the fiscal expansion. Again, the capital inflow that would be attracted by the higher interest rate at point A is infinite, but under floating rates the currency instantly appreciates, reducing net exports and shifting the IS curve back to the left.¹⁵ This is the same thing that happened with less-than-perfect capital mobility in Figure 23.1(c), but now the potential capital inflow and the appreciation of the currency are so large that the IS curve shifts all the way back to the starting point at E . This must be the case if the domestic interest rate is not to exceed the world rate. It also means that there is no effect on income at all; fiscal policy loses all power under floating exchange rates. This is the ultimate extrapolation of the argument that under floating rates, the higher the capital mobility, the lower the effectiveness of fiscal policy.

Even though Figure 23.4(b) looks the same after the fiscal expansion as before, it is not true that nothing at all has changed. The currency has appreciated in the meantime, which means that if the trade account was originally in balance, it is now in deficit. The trade deficit must be financed by a capital inflow for the overall balance of payments to be zero. Recall that when k is infinite, $i = i^*$ no longer implies that the capital account is necessarily zero. Rather, foreigners lend the amount necessary to finance the current-account deficit. They are happy to do so, as long as the home country pays the going rate of return.

Even though total GDP has not changed, the *composition* of GDP has. The share going to net exports is smaller. The share going to government expenditure is larger. Or, if the fiscal expansion took the form of a tax cut that increased households' disposable income, rather than an increase in government expenditure, then it is the share of GDP going to consumption that is larger. There is no crowding-out of investment because the interest rate has not risen. Even though crowding-out caused by the fiscal expansion is 100 percent (i.e., there is no effect on total GDP), all the crowding-out is now borne by the international sector.¹⁶

Finally, consider a monetary expansion under floating rates. When the LM curve shifts to LM' , the capital outflow that would take place at point A is infinite. Yet the currency instantly depreciates, stimulating net exports, shifting the IS curve to the right, and adding to the expansion of income. This is also what happened with less-than-perfect capital mobility, but now the shift continues until the economy moves all

¹⁵As in the case of imperfect capital mobility, the appreciation causes the BP schedule, as well as the IS curve, to shift to the left. However, because the BP curve is flat, horizontal shifts make no difference.

¹⁶In practice, there are a number of reasons why even under modern conditions of highly integrated financial markets, most countries cannot borrow an unlimited amount at a given interest rate: (1) If the country is large, it will drive up the world interest rate, as we will see in Chapter 25. (2) If the currency is expected to depreciate in the future (perhaps because of a large accumulation of indebtedness to foreigners), foreign investors will demand a higher interest rate on domestic assets in compensation, as we will see in Chapter 27. (3) If foreigners are highly risk averse and wish to diversify their portfolios, they may become reluctant to put an ever-increasing share of their wealth into domestic assets, as we will see in Chapter 28.

the way to the original interest rate at point *B*. The effect of the monetary expansion on income is not only greater than it was under fixed exchange rates, it is also greater than it was under lesser degrees of capital mobility. Monetary policy reaches its peak effectiveness under floating rates and perfect capital mobility. One way of describing the result is in terms of the money market equilibrium condition, Equation 22.4. Normally, when there is an increase in the real money supply, the interest rate falls, so as to help increase the demand for money and restore equilibrium. Here, however, the interest rate is tied to the foreign interest rate. As a result, the increase in income must be so great that the increase in the transaction demand for money alone equals the increase in the money supply.

An implication is that the change in the exchange rate must be very large to generate the necessary increase in income, especially in the short run when the elasticities of export and import demand are low. This property of the model with perfect capital mobility helps explain the observed fact that floating exchange rates are highly variable.

In addition to the magnitude of the increase in income, a further striking result of perfect capital mobility is that the monetary expansion operates *entirely* via the international sector, that is, by depreciating the currency and stimulating net exports. *None* of the expansion comes from the usual domestic route, that is, by reducing the interest rate and stimulating investment.

To summarize the conclusions regarding perfect capital mobility, there is a neat symmetry in the results. Under fixed exchange rates, fiscal policy reaches its peak effectiveness and monetary policy becomes completely powerless. Under floating exchange rates, by contrast, fiscal policy loses all power and it is monetary policy that reaches its peak effectiveness. Some of the results seem too strong to be taken literally. For example, it is hard to believe that a monetary expansion under floating rates has none of its effect via domestic demand. More generally, there is an obvious problem with the proposition that international capital flows force the domestic interest rate into continuous equality with the foreign interest rate. Interest rates are in fact observed to differ across countries. For example, the U.S. interest rate has exceeded the Japanese interest rate for years. How can such differentials exist if transaction costs, capital controls, and other barriers to the movement of capital across national boundaries are as low as was argued in Chapter 20? Why doesn't all the capital flow to the country paying the higher interest rate?

The answer is that one country's interest rate is measured in dollars and the other's in yen. Investors will not treat the two interest rates as the same because of the likelihood of future changes in the exchange rate. If investors think there is a danger that the dollar will depreciate in the future, then they will only be willing to hold dollar assets if the dollar interest rate is higher than that on yen assets, thus compensating them for their threatened loss. Chapter 27 will introduce exchange rate expectations as a factor that enters investors' calculations in addition to interest rates. As a result, some of our conclusions regarding the operation of monetary and fiscal policy will be modified.

Consider point *B* in Figure 23.3, where a monetary expansion has driven down both the interest rate and the value of domestic currency. We have argued that in the absence of barriers to capital flows, this point is not an equilibrium because the domes-

tic interest rate is lower than the foreign interest rate. This argument changes when allowance is made for investors' expectations of possible changes in the exchange rate. If investors have an expectation that domestic currency will appreciate in the future, then they may be happy at B holding domestic assets, despite the lower interest rate.

Why should they have an expectation of future appreciation? At B the currency has depreciated, perhaps considerably. If investors' expectation of the long-run or future exchange rate has not changed much, then they will expect the currency to appreciate in the future because it is below that value now. This is called *overshooting*. Today's depreciation of the currency generates the expectation of a future appreciation back in the direction from which it came. If expectations are formed in this manner, then B can be an equilibrium after all. This makes the model developed here more realistic. The first implication of introducing expectations is that the domestic interest rate can lie below the world interest rate despite perfect capital mobility. The second is that some of the stimulus to output can come from domestic demand such as investment; it need not all come from net foreign demand such as exports. The third is that the exchange rate doesn't have to move quite as far as was previously thought, when higher output had to bear the entire burden of higher money demand.

An analogous point applies in the case of a fiscal expansion. Point B in Figure 23.1(c) could be an equilibrium, despite the fact that the interest rate is higher at home than abroad, provided investors hold the expectation that the domestic currency will depreciate in the future. Investors will indeed hold such an expectation after the currency has appreciated to get to B , provided their expectation of the future level of the exchange rate does not change much. If there is an expectation of future depreciation that is enough to compensate, then the domestic interest rate can lie above the world rate despite perfect capital mobility. A second realistic consequence is that there is now some crowding-out of investment; net exports do not bear the entire burden of the crowding-out, as they appeared to in Figure 23.4. A third is that total crowding-out of other sectors by the fiscal expansion is less than 100 percent: There is some expansionary effect on aggregate GDP after all. A fourth implication is that the movement in the exchange rate need not be quite as large as when it had to shift the IS curve all the way back to E .

Chapter 27 will explore at greater length the determination of expectations and the role that this additional factor has in the determination of the exchange rate. The chapter will concentrate on the effects of changes in monetary policy, including not just the short-run effects on the exchange rate at a point like B in Figure 23.3, but also the effects expected with the passage of time.¹⁷

¹⁷We will see the effects of the monetary expansion as the price level adjusts over time. It will turn out that at point B in Figure 23.4(d), the expectation of future appreciation of the currency is precisely the correct one for investors to have. The situation is a little different for a fiscal expansion. Expected future adjustment of the price level is not sufficient for investors at point B in Figure 23.4(c) to hold an expectation of future depreciation. For that we would need to introduce expected future adjustment of the level of foreign indebtedness. Jacob Frenkel and Assaf Razin, "The Mundell-Fleming Model a Quarter Century Later: A Unified Exposition," *IMF Staff Papers*, 34, no. 4 (December 1987): 567-620.

23.4 Summary

This chapter showed the difference that international capital mobility makes under floating exchange rates in the modern world economy, particularly regarding the effects of monetary and fiscal policy. It turns out to make quite a difference. As in the preceding chapters, a country's capital account depends on the difference between its interest rate and foreign interest rates. The implications are quite different under floating exchange rates, however, than they are when the exchange rate is held fixed.

A monetary expansion causes depreciation of the currency, which tends to stimulate the trade balance. The effect is greater, the higher the degree of capital mobility, and thus the greater the capital outflow in response to the decline in the interest rate. When capital mobility is very high, a monetary expansion has a major effect on output, but the effect comes primarily through currency depreciation stimulating net foreign demand rather than through the traditional channel of a lower interest rate stimulating domestic demand.

Although capital mobility changes the results in one direction for the case of monetary policy (giving it a greater effect on total GDP), it changes it in the opposite direction in the case of fiscal policy (giving it a smaller effect). If capital mobility is high, the capital inflow attracted by a fiscal expansion causes the currency to appreciate, which in turn discourages net exports. The higher the degree of capital mobility, the higher the crowding-out of the trade balance via a higher valued currency—as opposed to the traditional crowding-out of investment via a higher interest rate—and the smaller the effect of the fiscal expansion on total GDP.

The switch in macroeconomic policy undertaken in the United States in the 1980s offers a good illustration of these principles. The government enacted a large fiscal expansion in the early 1980s, with the Federal Reserve keeping a firm rein on monetary policy. The result of this unprecedented shift in the monetary/fiscal policy mix was an increase in U.S. interest rates, a large capital inflow, an appreciation of the dollar, and an unprecedented U.S. trade deficit. Germany in 1990–92 and the United States in 2005 offer more recent examples.

CHAPTER PROBLEMS

1. A country imports wine, exports steel, and has a floating exchange rate. If it raises government spending on health care, increasing the budget deficit, how are the following four domestic interest groups affected: hospital workers, steel mills, wineries, and construction workers? How does your answer depend on the degree of international capital mobility?
2. This question refers to ten possible Keynesian small-country models:
Interest rate fixed (e.g., accommodating monetary policy)
 - a. closed economy
 - b. open economy; fixed exchange rates
 - c. open economy; floating exchange rates

Open economy: interest rate determined by IS-LM

- d. no capital mobility; fixed exchange rates; reserve flows sterilized
- e. no capital mobility; fixed exchange rates; reserve flows not sterilized
- f. no capital mobility; floating exchange rates
- g. low capital mobility; floating exchange rates
- h. high capital mobility; floating exchange rates
- i. perfect capital mobility; floating exchange rates
- j. perfect capital mobility; fixed exchange rates

The government increases expenditure. In each case, indicate under which of the two models there is a larger effect on income, and explain why (in a few words, or with a graph labeled with letters).

- | | | |
|------------|------------|-------------|
| 1. a vs. b | 5. d vs. f | 9. h vs. i |
| 2. b vs. c | 6. d vs. g | 10. d vs. j |
| 3. b vs. d | 7. f vs. g | 11. b vs. j |
| 4. d vs. e | 8. d vs. h | |

3. You are the finance minister of the country of Fuji, which still has some capital controls in place. A large trading partner has undertaken a fiscal expansion, pushing its interest rate above yours and causing capital to flow from Fuji to the other country. (The interest rates are not equalized because of the capital controls.) The authorities in the other country are unhappy with the fact that their currency has appreciated against yours and with the consequent trade deficit. They ask you to remove your capital controls, with the aim of helping their currency depreciate against yours and improving their trade balance. How do you respond?

Extra Credit

4. For this question, it will help to use linearized versions of Equations 22.2 and 22.3:

$$Y = (\bar{A} - bi + \bar{X} - \bar{M}) / (s + m)$$

$$M/P = KY - hi$$

A fiscal expansion is known to cause the currency to appreciate if the degree of capital mobility, k , is sufficiently high. What exactly is the necessary condition on k (in Equation 22.4) in terms of the other parameters?

SUGGESTIONS FOR FURTHER READING

Cooper, Richard. "The U.S. Payments Deficit and the Strong Dollar: Policy Options," *The U.S. Dollar—Recent Developments, Outlook, and Policy Options* (Federal Reserve Bank of Kansas City, 1985), p. 157. Discusses alternative explanations for the strength of the dollar in the early 1980s and the resulting trade deficit (most importantly the shift in the monetary/fiscal mix).

- Eichengreen, Barry, and Charles Wyplosz. "The Unstable EMS," *Brookings Papers on Economic Activity* (1993): 51–143. European central banks in 1992 found they could not defend their declared exchange rate targets in the face of huge capital movements.
- Fleming, J. M. "Domestic Financial Policies Under Fixed and Under Floating Exchange Rates," *IMF Staff Papers*, 9, no. 3 (1962): 369–379. The complete Mundell-Fleming model succinctly developed.
- Frankel, Jeffrey. "Could the Twin Deficits Jeopardize U.S. Hegemony?" *Journal of Policy Modeling* (forthcoming in 2006). Is 2001–2006 a replay of 1981–1985? Or rather, of 1966–1971?
- Mundell, Robert. "Capital Mobility and Stabilization Policy Under Fixed and Flexible Rates," *Canadian Journal of Economics and Political Science* (November 1963): 475–485. The original model with perfect capital mobility.