The section on the liquidity trap (p.341) has an update.

CHAPTER 18

# Spending and the Exchange Rate in the Keynesian Model

Chapter 17 developed the Keynesian model for determining income and the trade balance in an open economy. In this chapter we consider some further applications of the same model, including how governments can change spending in pursuit of two of their fondest objectives—income and the trade balance. We begin with the question of how changes in spending are transmitted from one country to another. Throughout, we focus particularly on the role that changes in the exchange rate play in the process. We bring together the analysis of flexible exchange rates from Chapter 16 with the analysis of changes in expenditure from Chapter 17.

## 18.1 Transmission of Disturbances

Section 17.5 showed how income in one country depends on income in the rest of the world, through the trade balance. The effect varies considerably, depending on what is assumed about the exchange rate. This section compares the two exchange rate regimes, fixed and floating, with respect to the international transmission of economic disturbances. This comparison is one of the criteria that a country might use in deciding which of the regimes it prefers.

### Transmission Under Fixed Exchange Rates

Our starting point will be the regime of fixed exchange rates. For simplicity, return to the small-country model of Section 17.1. In other words, ignore any repercussion effects via changes in foreign income. As Equation 17.9 implies, an internal disturbance, such as a fall in investment demand $\Delta\bar{I}$, changes domestic income by

$$\frac{\Delta Y}{\Delta \bar{I}} = \frac{1}{s + m} \tag{18.1}$$

in the small-country model. Recall that the multiplier here is smaller than in the closed-economy multiplier because some of the change in aggregate demand "leaks out," or is transmitted to the rest of the world. An external disturbance such as a fall in export demand, $\Delta\bar{X}$, changes income by the same amount.

$$\frac{\Delta Y}{\Delta \bar{X}} = \frac{1}{s + m} \tag{18.2}$$

In this case some of the *foreign* change in aggregate demand is transmitted through the trade balance to the *home* country.

The two-country model would serve as well here. The domestic spending multiplier would be a little higher, as in Equation 17.14, because some import leakage returns in the form of exports. The same applies to the export multiplier. The important point is that under fixed rates, disturbances are generally transmitted positively from the country of origin to the trading partners via the trade balance.

## Transmission Under Floating Exchange Rates

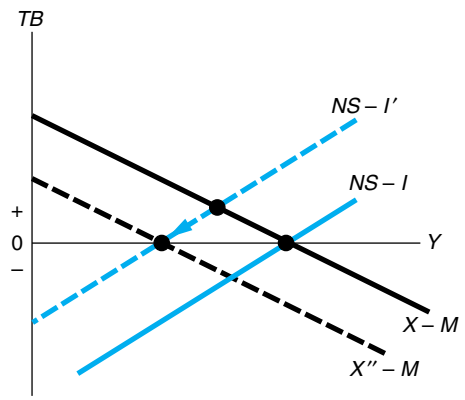
Now assume that the central bank does not participate in the foreign exchange market. Thus the exchange rate adjusts automatically to ensure $BP = 0$. Continue to assume no capital flows (or transfers), so $TB = 0$ as well. In the case of an internal disturbance, a fall in investment demand $\Delta\bar{I}$ would cause a fall in income and a consequent trade surplus under a fixed exchange rate. The $S - I - G$ line shifts up, as is seen in Figure 18.1(a). However, under floating exchange rates a surplus is impossible because the central bank is no longer in the business of buying or selling foreign exchange. In response to what would otherwise be an excess supply of foreign currency, the price of foreign currency automatically falls—that is, the domestic currency automatically appreciates. The effect of an appreciation of the currency is the same as it would be if the government deliberately increased the value of the currency: Imports are stimu-

**FIGURE 18.1**

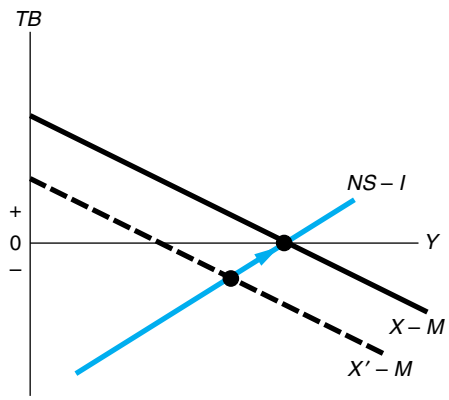
**Insulation Under Floating Exchange Rates**

Panel (a) shows how domestic disturbances are "bottled up" inside the country. A fall in investment, *I*, has a greater effect on income under a floating rate than under a fixed rate because the currency appreciates and discourages net exports. Panel (b) shows how the country is "insulated" from foreign disturbances. A fall in foreign demand causes the domestic currency to depreciate, which stimulates net exports.

(a) Internal Disturbance Under Floating Rates




(b) External Disturbance Under Floating Rates



lated and exports discouraged, and the $X - M$ line shifts down. The shift will be whatever is required to restore the trade balance to equilibrium. The required change in the exchange rate could be computed if the trade elasticities were known.

Whatever the exchange rate change, the ultimate effect is such that the trade balance remains at zero: $\Delta TB = 0$. From Equation 17.6,

$$\Delta TB = \Delta\overline{X} - m\Delta Y$$

So floating exchange rates imply that

$$\Delta\overline{X} = m\Delta Y$$

The downward shift in the component of net exports attributable to the appreciation must be sufficient to offset the decrease in imports attributable to lower income. To compute the change in income, note from Equation 17.7 that

$$\Delta Y = \frac{\Delta\overline{I} + \Delta\overline{X}}{s + m}$$

$$= \frac{\Delta\overline{I} + m\Delta Y}{s + m}$$

$$\Delta Y = \frac{\Delta\overline{I}}{s} \tag{18.3}$$

Compare this to the multiplier under fixed rates shown in Equation 18.1. The internal disturbance has a greater effect under floating rates than under fixed rates. The disturbance induces an exchange rate change that reinforces the effect on aggregate demand. In fact, the disturbance has the full closed-economy multiplier effect. The reason is that when the exchange rate fluctuates to keep the trade balance at zero, it reproduces the effect of a closed economy. *All disturbances are bottled up inside the country rather than being partially transmitted abroad.* The point can also be shown graphically. The $X - M$ line becomes irrelevant. Equilibrium income is determined wherever the $NS - I$ line crosses the zero axis because the floating exchange rate automatically ensures that the $X - M$ line crosses there as well. Because the $NS - I$ line has slope $s$, a disturbance that shifts it up by $\Delta\overline{I}$ reduces income by $\Delta\overline{I}/s$.

Now consider the case of an external disturbance. A downward shift of the $X - M$ line, as in Figure 18.1(b), would cause a fall in income and a trade deficit on a given exchange rate. The incipient trade deficit causes the currency to depreciate automatically, however, shifting the $X - M$ line back up until balanced trade is restored. At this point the effect on income is eliminated as well: $\Delta Y = 0$. *The floating exchange rate insulates the economy against foreign disturbances.* Again, by adjusting to keep the trade balance at zero, it reproduces a closed economy.

To sum up, floating rates (in the absence of capital flows) restrict the effects of disturbances to the country of origin. This result suggests one possible basis on which a country could choose between fixed and floating exchange rates. If the goal is to minimize the variability of domestic output, then the absence of international transmission is desirable to the extent that disturbances originate abroad because the home country is insulated from them. Floating would be better than fixed. However, the absence of

transmission is undesirable to the extent that disturbances originate domestically; the floating rate prevents these disturbances from being passed off to the rest of the world. Fixed is better than floating.

Conversely, if the goal is to allow each country to pursue its own independent policies, then the absence of transmission constitutes an argument for floating exchange rates. In the late 1960s when the world was still on fixed rates and excessive expansion in the United States was transmitted to the European countries as unwanted inflation, floating rates were suggested as the ideal solution. They would allow each country to pursue its preferred policies independently.

The conclusion that floating rates prevent transmission extends to the two-country model. As long as the trade balance is always zero, income must be determined by domestic demand. Chapter 25, however, will show that this conclusion does not extend to models with capital mobility, as then the trade balance need not equal zero. Furthermore, although foreign disturbances have no effect on domestic output and employment in the model of this chapter, they do affect domestic real income. The currency depreciation illustrated in Figure 18.1(b) turns the terms of trade against the home country: The price of imports rises in domestic terms, causing a fall in the real purchasing power of a given quantity of domestic output. Domestic residents will feel poorer even though national output is unchanged. Such changes in the terms of trade can have further implications; they are considered in the chapter appendix.

## 18.2 Expenditure-Switching and Expenditure-Reducing Policies

Chapter 17 explained the use of the Keynesian model in determining income and the trade balance. This section uses the model to show the most effective ways for government policy makers to combine the tools at their disposal to achieve their policy goals.

### Adjustment to a Current Account Deficit

Consider a country running a current account deficit. It has two broad choices: *financing* the deficit or *adjustment*. By financing we mean that the country chooses to continue running the deficit for the time being, either by borrowing from abroad (on the private capital account) or by running down its central bank's holdings of reserves (on the official reserves transactions account). Let us say that the country instead wishes or is forced to adjust—that is, to change macroeconomic policies in such a way as to eliminate the current account deficit. How, specifically, can it do this?

Expenditure-reducing policies and expenditure-switching policies are alternative ways to reduce a trade deficit. Measures to reduce overall expenditure, such as reductions in government expenditure or increases in taxes, work to reduce a trade deficit because some of the eliminated expenditure would have fallen on imports. Conversely, measures to increase expenditure increase the trade deficit, as was evidenced in the prior chapter (for example, in Figure 17.1 and Equation 17.10). There are also expenditure-reducing policies other than fiscal contraction, in particular monetary contraction. Monetary policy will be covered at the end of the chapter.

Expenditure-switching policies are those that, for any given level of expenditure, work to improve the trade balance by switching expenditure away from foreign goods and toward domestic goods. In the case of domestic expenditure, the result is a fall in imports. In the case of expenditure by foreigners, the result is a rise in exports to them. The expenditure-switching policy focused on so far is devaluation, as in Figure 17.2 and Equation 17.11.

Expenditure-reducing and expenditure-switching policies are equally valid ways of eliminating a trade deficit. The most important difference between the two is that the former accomplishes this by reducing income and employment, whereas the latter does so by—or, more precisely, with the effect of—raising income and employment.

## Types of Expenditure-Switching Policies

There are several possible expenditure-switching policies. One is price deflation, which makes domestic goods more attractive to residents of both countries. In practice, price deflation can usually be achieved only by expenditure reduction. The period of low income and high unemployment that must be endured before wages and prices come down can be long and painful. We continue to assume, in the Keynesian model, that because of the existence of minimum wage laws, unions, contracts, implicit contracts, money illusion—for whatever the reason—wage and price deflation is so difficult in the short run as to be ruled out.

Devaluation is the expenditure-switching policy on which we will continue to focus: Taking rigid prices as given, it works to cheapen domestic goods on world markets.

Direct trade controls can also be expenditure-switching policies. A common form of direct trade control is a tariff, which raises the price of imports and thus discourages domestic residents from buying them. An export subsidy, which lowers the price of exports and encourages foreign residents to buy them, is also sometimes used. A uniform 10 percent import tariff combined with a uniform 10 percent export subsidy would have the same effect on the relative prices facing each country as a 10 percent devaluation. The devaluation analysis would apply, in large measure unchanged.

In practice, tariffs and subsidies are enacted more often to help specific industries that are in trouble or that have sufficient political clout than to further macroeconomic purposes. Pure trade theory provides some persuasive microeconomic arguments against them, as explained in Part III. Nevertheless, these measures are sometimes imposed for macroeconomic reasons. In the 1930s the United States adopted the Smoot-Hawley tariff in an effort to switch expenditure toward domestic goods generally. Policies of this type, which are designed to switch spending to domestic products at the expense of other countries, are called "beggar-thy-neighbor."[1] The consequences in that case were disastrous, as was seen earlier in this text. Trading partners responded by putting up tariffs of their own to protect their trade balances, and the result was a global collapse in trade. Following World War II, the GATT was set up to negotiate reductions in tariffs.

[1] "Beggar" is used as a verb here, meaning "to impoverish."

Partly as a consequence of the success of the GATT (now the WTO), protection has shifted emphasis away from tariffs and toward other direct controls on trade, that is, toward nontariff barriers. One nontariff barrier is the quantitative restriction or quota. Some quotas, those imposed on industrialized countries on imports of textiles from labor-abundant countries, were abolished in 2005 under the terms of the Uruguay Round of negotiations concluded in 1994.

The economic analysis of an import quota is similar to the analysis of a tariff, in that a quota raises the domestic price. The two would be practically equivalent if the government auctioned off the licenses to import, so that the revenue accrued to the domestic government instead of to the importers fortunate enough to get the licenses. In practice, governments rarely auction off quotas. In the case of a tariff, the fact that the revenue goes to the domestic government is an obvious advantage from the national viewpoint, relative to a voluntary export restraint where the "revenue" goes to the foreign country. If the alternative is a domestically imposed quota, then the revenue generally accrues to domestic residents, as with a tariff. From a macroeconomic viewpoint, however, there is still an important difference between a tariff, under which the revenue accrues to the domestic government, and a quota, under which the revenue accrues to the domestic private sector. An increase in tariffs, like any tax increase, reduces the private sector's disposable income and constitutes a contractionary fiscal policy. Thus it has an expenditure-reducing side in addition to the expenditure-switching side and may have a bigger effect on the trade balance than would a domestically imposed quota.

Another nontariff barrier used sometimes when a government has a pressing trade balance crisis is advanced deposits on imports. An importer must place on deposit with the government a certain amount of money for a certain length of time, such as six months, without interest. The effect is the same as a tariff equal in amount to the interest on the deposit lost by the importer. Like a tariff, this barrier withdraws money from circulation and thus has an expenditure-reducing effect, in addition to the expenditure-switching effect.

The topic here is barriers to trade; barriers to capital flows will be discussed later. Nevertheless, one device for discouraging the outflow of money bears mentioning: the two-tier exchange rate. Suppose that South Africa is experiencing a substantial outflow of capital and downward pressure on the price of its currency. Because it wants to avoid worsening its inflation, as would follow if it devalues the South African rand, the central bank maintains its fixed exchange rate for current-account transactions but requires parties making capital-account transactions to use the competitive foreign exchange market. There the exchange rate is left free to find its own level. Those clamoring for foreign currency to buy foreign assets—that is, to export capital from South Africa—find the supply limited to the flow of currency made available by foreign residents desiring to export capital to South Africa. Capital exports and imports would be equated by the market-determined exchange rate for capital transactions, and no *net* international capital transfers could take place. This device could similarly be used to avert a revaluation when a country is experiencing capital inflows. The two-tier foreign exchange market is difficult to administer because it requires elaborate controls. If the price of the South African rand is higher in the competitive market for capital-account

transactions, those exporting capital to South Africa have an incentive to gain access to its currency at the cheaper rate for current-account transactions. In addition, South African importers who must buy foreign exchange at the (for them) less favorable current-account rate have an incentive to sell South African rand to buyers in the capital-account market. Controls must keep these parties apart if the system is to work.

Capital controls can impair economic efficiency because they keep capital from moving to where it earns a higher return. If the difference in returns faced by the lender is also a difference in real social productivity, the control imposes a welfare cost. One cannot be dogmatic, though, about the welfare costs of capital controls because governments use the interest rate—the return to capital—extensively as a policy variable. When the central bank is influencing the price of credit, the connection between the market price and social productivity of capital is no longer certain.

Another barrier that has been used by developing countries is multiple exchange rates. The government charges a higher price for foreign exchange when it is used to purchase luxury consumer goods than when it is used to purchase, for example, capital goods or—considered most essential of all—spare parts and fuel.

## The Swan Diagram

Assume that the government authorities have two policy goals. First, they want to attain external balance: for example, a trade deficit equal to zero. Second, they want to attain internal balance: output equal to full employment or potential output. (The situation in which demand exceeds potential output, $\overline{Y}$, can be considered undesirable because it leads to inflation.) There is a general principle that attaining two different policy goals requires two independent policy tools. In this case the two policy tools are expenditure-switching and expenditure-reducing policies, or, for concreteness, devaluation and government expenditure.[2] Each policy will be considered in isolation before we consider the use of both at once.

As already seen, government fiscal expansion raises output but worsens the trade balance. If the government were restricted to the use of fiscal policy, this would represent a dilemma. The government could adopt a contractionary fiscal policy to achieve external balance ($TB = 0$) at the expense of unemployment ($Y < \overline{Y}$), at point $X$ in Figure 18.2(a), or could adopt an expansionary fiscal policy to attain internal balance at the expense of a trade deficit ($TB < 0$), at point $N$. The government cannot, however, attain external and internal balance simultaneously, except by coincidence. Such simultaneous balance demands another policy tool.

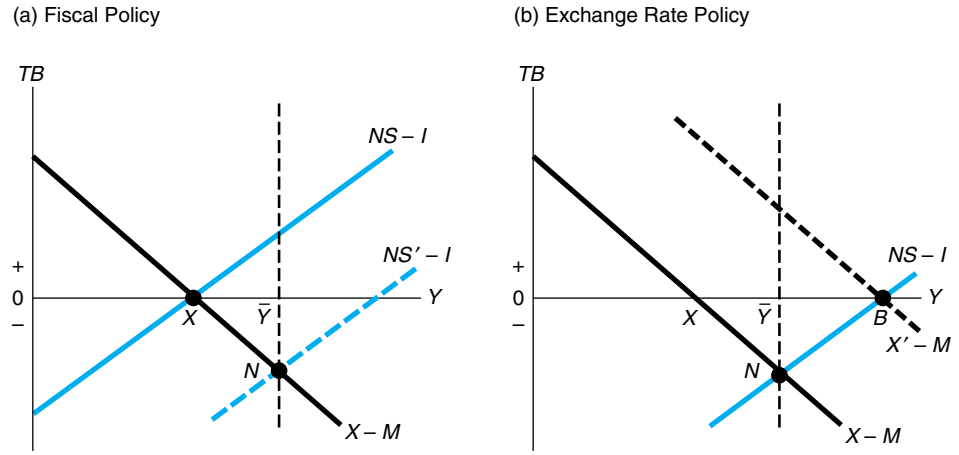
A devaluation also raises output, but it improves the trade balance. This presents another dilemma: whether (1) to choose a low exchange rate—that is, revalue to achieve internal balance ($Y = \overline{Y}$) at the expense of a trade deficit ($TB < 0$) at point $N$ in Figure 18.2(b); or (2) to choose a high exchange rate—that is, devalue, to achieve external balance ($TB = 0$) at the expense of excess demand ($Y > \overline{Y}$) at point $B$.

[2]The general principle originated with Jan Tinbergen. The application to the open economy was developed by James Meade. The application of the principle to an economy with international capital mobility, which we study in Chapter 22, was developed by Robert Mundell. All three won Nobel Prizes.

**FIGURE 18.2**

**Dilemma: External Balance or Internal Balance?**

Panel (a) shows how the government, using just fiscal policy, can attain either a zero trade balance at point *X* or full employment at *N*, but not both. Panel (b) shows how the government, using just exchange rate policy, again can attain either one goal at *B* or the other at *N*, but not both.




Obviously, to attain balance in both sectors, both policies must be used together. The case depicted in Figure 18.2 requires an intermediate exchange rate policy together with an intermediate fiscal policy.

Heavy use has been made of Figure 18.2, the diagram of income and the trade balance, with one schedule that holds for a given level of government expenditure and another that holds for a given level of the exchange rate. Now the situation will be inverted, shifting to a diagram of expenditure and the exchange rate, with one schedule that holds for a given level of income and another that holds for a given level of the trade balance. Same model, new graph.

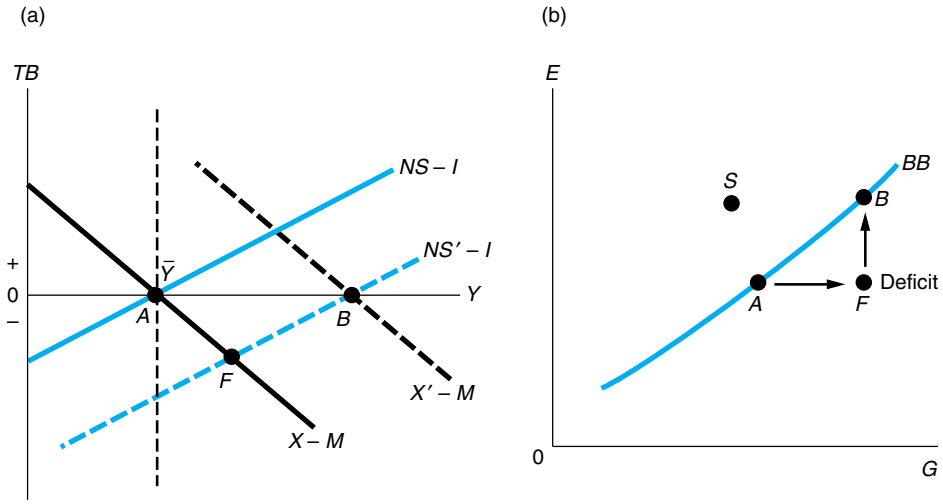
Assume that, by coincidence, the starting point is a position of both external and internal balance, point *A* in Figure 18.3(a). To begin, consider external balance. If the government increases expenditure, it must also devalue to maintain external balance, as at point *B*. Otherwise, it will go into deficit. For trade balance equilibrium to hold, *G* and *E* must vary together: Higher expenditure must be accompanied by a higher exchange rate. This means that the combinations of *G* and *E* that imply external balance in Figure 18.3(b) are represented by an upward-sloping line: the *BB* schedule.

It is quite likely that the economy is at a point off the line *BB*. At any point, *F*, that is below and to the right of *BB*, *E* is too low or *G* too high for external balance. This is a point of trade deficit. Total expenditure is too high, or too large a fraction of expenditure falls on foreign goods. It is necessary to reduce expenditure (cut *G*) or switch expenditure toward domestic goods (raise *E*) to return to balanced trade. Similarly, at any point, *S*, above and to the left of *BB*, *E* is too high or *G* too low, for external bal-

**FIGURE 18.3**

**Policy Combinations That Give External Balance**

After a fiscal expansion, there must also be a devaluation if the trade balance is to be restored to its original level. In panel (a), the axes represent the policy goals. In panel (b), the axes represent the policy instruments.




ance. This is a point of trade surplus. $G$ would have to be increased or $E$ reduced, to return to balanced trade. Only under a floating exchange rate regime will the economy necessarily be on the $BB$ line. In that case, the exchange rate adjusts automatically, so as to maintain an external balance. Under fixed rates it is possible to be anywhere on the graph.

Now consider internal balance. Return in Figure 18.4(a) to point $A$ and the exercise of an increase in government expenditure. Now observe, however, that the government will have to *revalue* if it wants to maintain internal balance, as at point $N$. Otherwise, the economy will suffer from excess demand. To stay at the same level of demand, output, and employment, $G$ and $E$ must vary inversely: Higher expenditure must be accompanied by a lower exchange rate. This result yields the $YY$ schedule in Figure 18.4(b). The combinations of $G$ and $E$ that imply internal balance are represented by a downward-sloping line.

Again, it is perfectly possible that the economy is off the line $YY$. At any point, $F$, above and to the right of $YY$, the exchange rate $E$ is too high, or too large a fraction of expenditure falls on domestic goods. It is necessary to reduce expenditure (cut $G$) or switch expenditure toward foreign goods (reduce $E$) if the country is to return to potential output. Similarly, at any point, $U$, below and to the left of $YY$, $E$ is too low or $G$ is too low for internal balance. This is a point of excess supply or unemployment. $G$ or $E$ would have to be increased to return to full employment. In general, there is no reason necessarily to be on the $YY$ line.

**FIGURE 18.4**

**Policy Combinations That Give Internal Balance**

After a fiscal expansion there must also be a revaluation of the currency if the level of output is to be restored to its original level. In panel (a), the axes represent the policy goals. In panel (b), the axes represent the policy instruments.

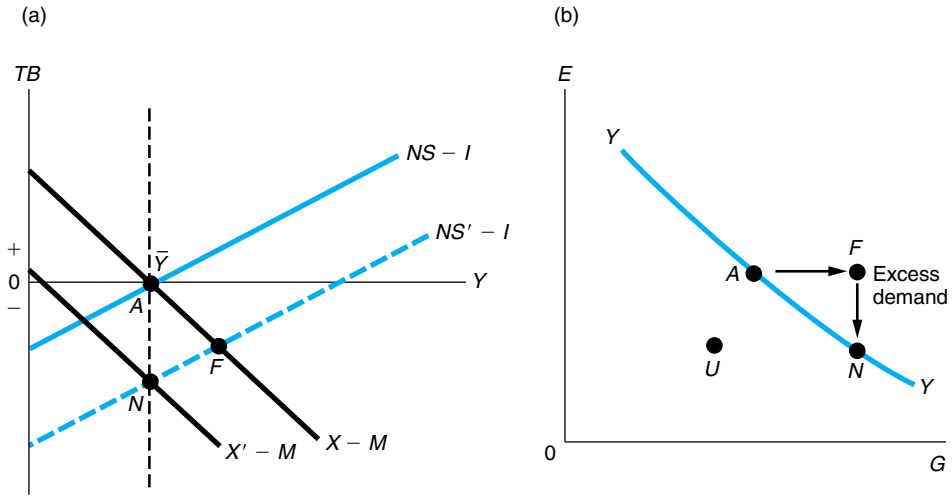


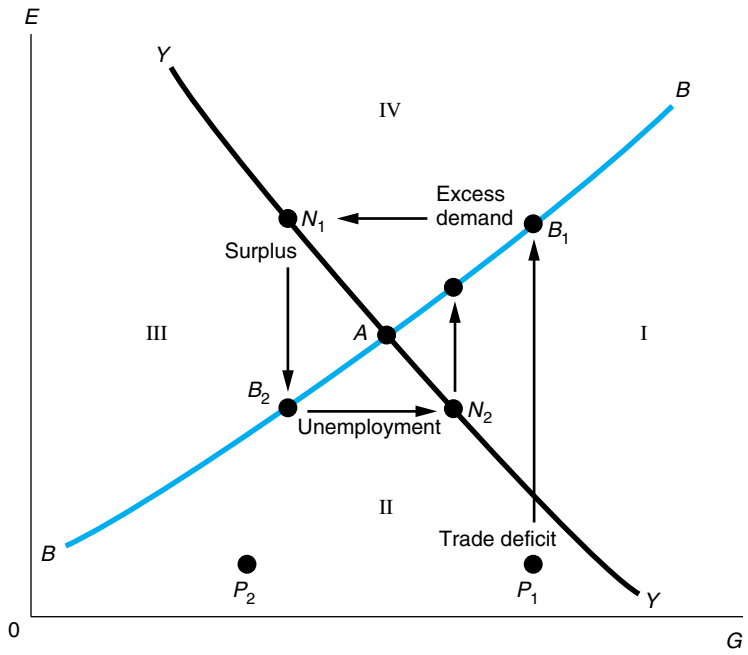

Figure 18.5 shows the *BB* and *YY* schedules together, in a graph known as the Swan diagram.[3] There are four zones. Zone I indicates a combination of trade deficit and excess demand, Zone II a deficit and unemployment, Zone III a trade surplus and unemployment, and Zone IV a surplus and excess demand. There is only one point of full equilibrium, *A*. Again, both tools are needed to attain it. For example, many countries find themselves at a point like $P_1$: deficit and unemployment. They could raise *G* to reach full employment at the expense of a greater deficit or cut back *G* to attain balanced trade at the expense of greater unemployment. The correct strategy is to cut *G* and devalue, attaining internal and external balance simultaneously at *A*. Of course, policy-making is not always this easy in practice. For example, the symptoms at point $P_2$ are the same, deficit and unemployment, and yet the correct strategy here is to devalue and *raise G*. In practice, this might only be discovered by experimentation: devaluing and then waiting to see what happens before deciding whether to change expenditure. (Appendix B carries this analysis further.)

[3]The Swan diagram was invented by Trevor Swan, "Longer-run Problems of the Balance of Payments," 1955; reprinted in R. Caves and H. Johnson, eds., *Readings in International Economics* (Homewood, IL: Richard Irwin, Inc., 1968): pp. 455–464. It was further developed in W. Max Corden, "The Geometric Representation of Policies to Attain Internal and External Balance," *Review of Economic Studies,* 28 (1960): pp. 1–22.

**FIGURE 18.5**

**The Swan Diagram of Internal and External Balance**

The *BB* schedule shows the combinations of spending, *G*, and the exchange rate, *E*, that give the desired trade balance. The *YY* schedule shows the combinations that give the desired level of output. Only by deliberately using both independent policy instruments could the government attain both policy goals at point *A*.




## 18.3 Monetary Factors

The discussion of policies to change the level of expenditure has so far focused on fiscal policy. However, it is easy enough to put monetary policy into the Keynesian model. The mechanism of transmission from the money supply to income is the interest rate. Assume that expenditure, in particular, investment—which has been treated previously as exogenous—is now a decreasing function of the interest rate. The interest rate is the cost of borrowing to firms. If it falls, firms are more likely to undertake investment projects. Households may raise their expenditure as well and so reduce savings. Residential construction and purchases of consumer durables (automobiles, household appliances, and so forth) are often particularly sensitive to interest rates.

Figure 18.6 shows how a decrease in the interest rate shifts the $NS - I$ line down. Equilibrium occurs at a higher level of income, $Y_2 > Y_1$. Thus an inverse relationship between the interest rate and income is traced out, describing equilibrium in the goods market. This relationship is none other than the *IS* curve, from the familiar closed-economy *IS-LM* analysis of intermediate macroeconomics courses.

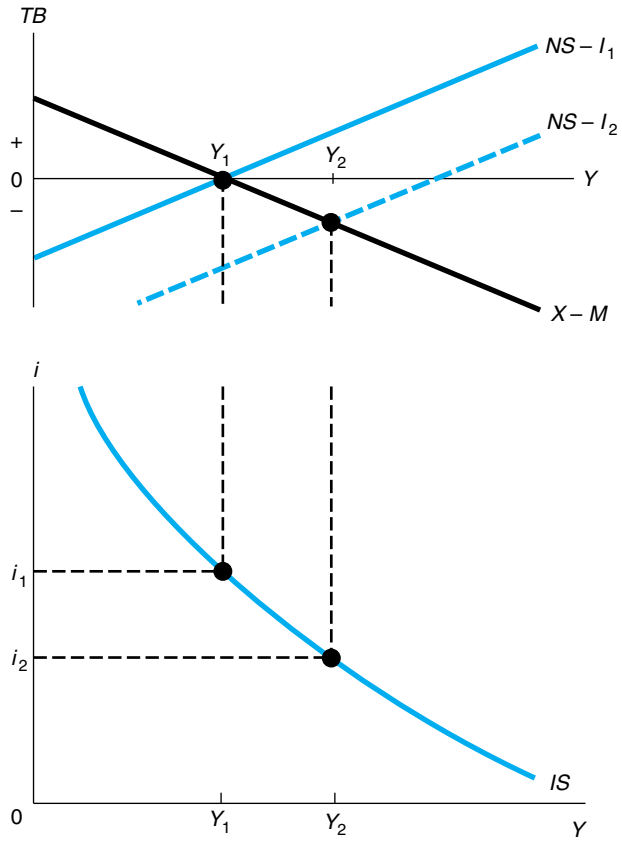
What would make the interest rate fall to begin with? The obvious answer is monetary policy. The central bank usually sets the interest rate directly. In the 1980s, however, it was more common to treat the central bank as setting the money supply. The interest rate then adjusted to equilibrate the money supply with money demand.

Individuals balance their portfolios between money and other assets, such as stocks and bonds. Their demand for money is a decreasing function of the rate of return on

**FIGURE 18.6**

**Effect of a Fall in the Interest Rate, *I***

If monetary policy lowers the interest rate from $i_1$ to $i_2$, then it stimulates investment from $I_1$ to $I_2$. The saving-investment line shifts out, raising the level of income from $Y_1$ to $Y_2$. This inverse relationship between $i$ and $Y$ is the *IS* curve.



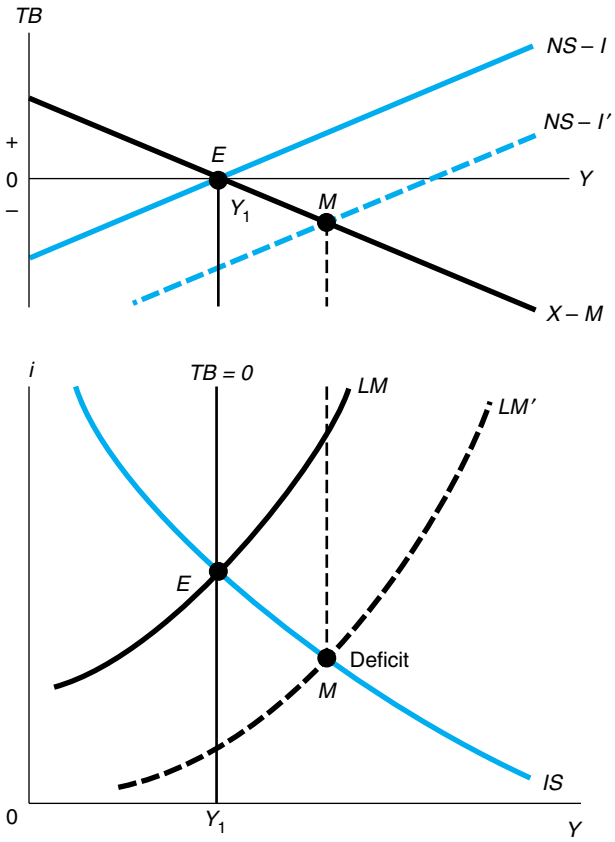

alternative assets, represented by the interest rate. Yet even though money pays no interest, people must hold some to undertake transactions. The demand for real money balances is thus an increasing function of real income. If income were to go up, and nothing else changed, the demand for money would go up. For a given real money supply, to maintain equilibrium in the financial markets (demand equals supply) something else must change: The interest rate must rise to make bonds more attractive and money less attractive. Only then will money demand be equal to the existing money supply. Thus the lower part of Figure 18.7 traces a positive relationship between the interest rate and income, describing equilibrium in the financial market. For a given real money supply, the two variables must move together, precisely because they have offsetting effects on money demand. This relationship is the familiar *LM* curve. The intersection of the two curves, *IS* and *LM*, gives the equilibrium level of income and interest rate.

Notice that there is a unique critical level of income that implies a zero trade balance, $Y_1$, in the upper panel of Figure 18.7. Anywhere to the right of $Y_1$ is a point of trade deficit because imports are too high. Anywhere to the left of $Y_1$ is a point of surplus because imports are too low. An expenditure-switching policy that shifts the $X - M$ line will change the critical level of income consistent with $TB = 0$.

**FIGURE 18.7**

**Monetary Expansion**

The upward-sloping *LM* curve gives equilibrium in the money market. An increase in the money supply shifts the *LM* curve out, driving down the interest rate, *i*, at point *M*, and as a result increasing income, *Y*. The trade balance worsens.




## Monetary Expansion

The following analysis will begin from a point where the equilibrium level of income given by the *IS*-*LM* intersection also implies a zero trade balance, point *E* in Figure 18.7. We will consider in turn the effects of three policy changes: a monetary expansion, a fiscal expansion, and a devaluation.

The monetary expansion shifts the *LM* curve to the right. For the higher money supply to be willingly held, either the interest rate must fall or income must rise. In fact, both happen; the interest rate falls and stimulates investment and thus income. The new equilibrium occurs at point *M*. Because this is to the right of the $TB = 0$ point, clearly the higher level of expenditure stimulated by the expansion has pushed the country into trade balance deficit.

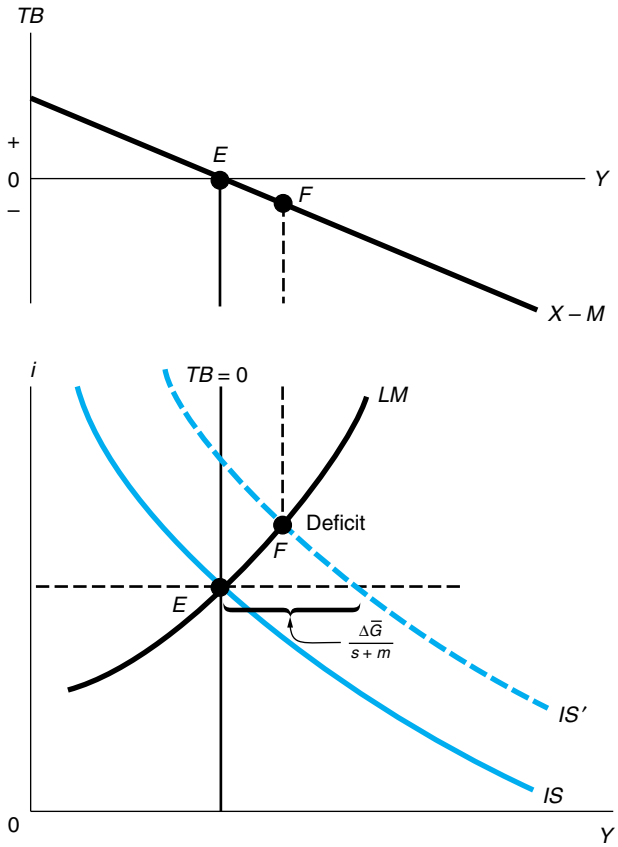
## Fiscal Expansion and Crowding-Out

Figure 18.8 depicts an increase in government expenditure, $\Delta G$. The fiscal expansion shifts the *IS* curve to the right: Any given interest rate and consequent level of investment, which previously implied a particular level of income, now imply a higher level of

**FIGURE 18.8**

**Fiscal Expansion with Crowding-Out of Investment**

An increase in spending shifts the *IS* curve to the right by the amount of the simple Keynesian multiplier. However, the actual increase in income is somewhat less than this, at point *F*, because an increase in the demand for money drives up the interest rate and crowds out investment.




income. In fact, the distance that the fiscal expansion shifts the *IS* curve to the right can be precisely stated. The simple Keynesian multiplier analysis of Section 17.1 showed that, for a given interest rate, income increases by $\Delta Y = \frac{1}{s + m}\Delta\overline{G}$ (Equation 17.9). Previously, that formula was the complete answer to the question of how much income increases because the interest rate was assumed to be constant. Now it only answers the question of how much the curve shifts because the interest rate is no longer necessarily constant. The increases in expenditure and income raise money demand, forcing the interest rate up, which in turn discourages private investment. The new equilibrium occurs at point *F*. Income is still higher than at point *E*, but some of the effect of the fiscal expansion has been offset by the crowding-out of investment. The overall effect on income is somewhat *less* than the full open-economy multiplier effect.[4]

[4]The $NS - I$ schedule has not been explicitly drawn in the upper half of Figure 18.8. It initially runs through point *E*. Then the fiscal expansion shifts it to the right, by $\Delta G/(s + m)$, and the increase in $i$ immediately shifts it part of the way back to the left. It ends up intersecting the $X - M$ line at point *F*.

Notice that the economy is again in trade deficit at point *F* because of higher imports. In this model, monetary and fiscal expansions operate in the same way. Both raise expenditure, thus raising income and worsening the trade balance. They differ only in their implications for the composition of the given level of output, a monetary expansion favoring private investment and a fiscal expansion favoring government spending (or, in the case of a tax cut, favoring consumer spending).

1-page attachment on ZLB appears at bottom of page.

## The Liquidity Trap and Japan in the 1990s

The Keynesian model omits such concerns as inflation and government borrowing. Many a country has justified a fiscal expansion as a supposedly temporary measure aimed at counteracting a recession, only to be stuck for years thereafter with an unsustainable buildup in debt, entrenched inflation, and high interest rates. For such reasons, the Keynesian model is generally regarded as a poor guide to fiscal policy-making in practice, perhaps even as obsolete.

The example of Japan in the 1990s, however, illustrates that the Keynesian model is still relevant. Bubbles in the Japanese stock and real estate markets in the late 1980s collapsed after 1990, leading to a period of deflation, unemployment, and slow growth. Despite a decade of recession, almost reminiscent of the Great Depression of the 1930s, goods prices in Japan did not decline enough to restore equilibrium.

Furthermore, the response of the Japanese economy to monetary and fiscal policy suggested that it may have been caught in a rare case of a liquidity trap. In an effort to stimulate the economy, the Bank of Japan lowered interest rates, virtually to zero. After that, further reductions in interest rates were not possible. This is the definition of a liquidity trap; further increases in the money supply are simply absorbed by the public without bringing about a reduction in the interest rate. In terms of Figure 18.8, the *LM* curve becomes completely flat, like the horizontal dotted line that runs through point *E*.

The liquidity trap has two strong implications for policy. First, monetary policy becomes ineffective. A monetary expansion still "shifts the *LM* curve to the right," but because the curve is flat in this range, there is no stimulus to the demand for goods. Thus the Bank of Japan declared in the late 1990s that no further stimulus to output was possible. Second, fiscal policy becomes *more* effective. Because the *LM* curve is flat, there is no increase in the interest rate to crowd out private spending as at point *F*; instead the full multiplier effect shows up.

In 1997 the government of Japan raised taxes, out of concerns that accumulating fiscal deficits were saddling the next generation with rising levels of debt. Unfortunately the immediate effect was to reduce consumption and send the economy into a renewed recession. The multiplier effect was alive and well.

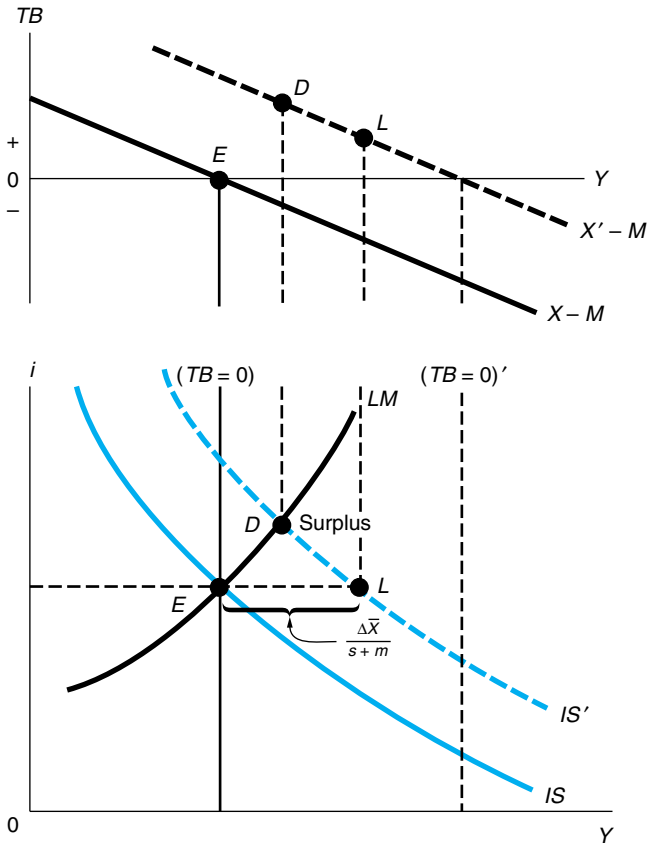
## Devaluation and Crowding-Out

We now turn from the two kinds of policies affecting the level of expenditure to an expenditure-switching policy, devaluation. Figure 17.2 showed that, assuming the Marshall-Lerner condition holds, a devaluation shifts the $X - M$ line up by some

**FIGURE 18.9**

**Devaluation with Crowding-Out**

A devaluation shifts the *IS* curve to the right by the amount of the simple Keynesian multiplier (at point *L*). However, the actual increase in income is somewhat less than this because investment is crowded out at *D*. The trade balance improves.




positive amount, called $\Delta\overline{X}$. For any given level of investment, equilibrium occurs at a higher level of income. Thus, for any given interest rate, the equilibrium point in the lower panel of Figure 18.9 shifts to the right. From Section 17.1, it is even possible to state by how much it shifts to the right: For a given interest rate, $\Delta Y = \frac{1}{s+m}\Delta\overline{X}$. The actual overall effect on $Y$ is less, as can be seen at the new *IS*-*LM* intersection, point *D*.[5] Like the increase in demand from the government sector, the increase in demand from the foreign sector raises output, but the effect is partly offset by the investment crowded out by higher interest rates.

Despite the move to the right, point *D* brings a trade surplus, not a trade deficit. As shown in the upper panel in Figure 18.9, the critical level of income that implies a zero trade balance has shifted to the right. Furthermore, the $TB = 0$ line has shifted to the right by *more* than the *IS* curve. How do we know this? Imagine for a moment a per-

[5]In terms of the upper panel, the $NS - I$ schedule has shifted to the left (again because of the increase in $i$), so that it intersects $X' - M$ at *D*.

fectly flat $LM$ curve (the liquidity trap), such that the devaluation causes a move to point $L$. Section 17.1 showed that the trade balance would improve, by

$$\begin{aligned}\Delta TB &= \Delta\overline{X} - m\Delta Y \\ &= \Delta\overline{X} - m\frac{1}{s+m}\Delta\overline{X} \\ &= \frac{s}{s+m}\Delta\overline{X} > 0\end{aligned}$$

*The marginal propensity to import times the increase in income is only a partial offset to the improvement in the trade balance.* When the $LM$ curve has some slope, the change in the trade balance is still $\Delta TB = \Delta\overline{X} - m\Delta Y$, but now crowding-out means that $\Delta Y$ is smaller than the simple multiplier formula indicates. The marginal propensity to import has even less of an offsetting effect on the trade balance. If there is a surplus at $L$, there is an even greater surplus at $D$. This proves that the vertical $TB = 0$ line shifts right by more than income increases, leaving $D$ to the left of the new line.[6] Intuitively, income would not have increased in the first place if devaluation did not, on net, stimulate the trade balance.

This section has shown how the effectiveness of fiscal expansion or devaluation in stimulating demand is reduced by crowding-out, and how monetary expansion is an alternative policy for stimulating expenditure. Most of this closely resembles material covered in an intermediate, closed-economy macroeconomics course. Opening the economy up to foreign trade has merely appended the trade balance as a function of income.

## 18.4 Summary

This chapter used the Keynesian model developed in Chapter 17 to study two types of exogenous policy changes: expenditure-switching policies such as devaluation, and expenditure-reducing (or expenditure-increasing) policies such as government spending. It also examined the effects of changes in such policy instruments on the two policy targets: internal balance (GDP at the full-employment level, for example) and external balance (the trade balance at zero, for example). A general principle was demonstrated: If a country is to attain both policy targets, the government must use two independent policy instruments, such as fiscal policy and the exchange rate.

A second lesson concerned the regime of floating exchange rates, in which the value of the currency adjusts automatically to equilibrate the balance of payments. Under a regime of fixed rates, disturbances are transmitted from one country to another. However, a regime of floating rates helps insulate countries from each other's disturbances because the exchange rate ensures that the balance of payments is zero.[7]

---

[6]The $TB = 0$ schedule shifts to the right by $\Delta\overline{X}/m$. (In other words, only if $m\Delta Y = \Delta\overline{X}$ is $TB$ unchanged.) However, as can be seen in the figure, the $IS$ curve shifts to the right by a smaller amount: $\Delta\overline{X}/(s+m)$.

[7]This chapter continues to assume the absence of international financial flows, so the overall balance of payments is the same as the trade balance. Part V will introduce capital flows; one consequence will be that floating exchange rates do not provide complete insulation.

A third lesson was that crowding-out effects via the domestic interest rate, which must be taken into account if the central bank keeps the money supply constant, decrease the effect of a fiscal expansion on domestic income.

The chapter concluded by introducing monetary policy into the model for the first time, thus leading to the subject of Chapter 19.

Chapter 19 will return to the *IS-LM* graphs to analyze the effects of reserve flows, and Chapter 22 will explore the effects of international capital mobility. Chapter 22 will also present greater synergy between the financial markets and the foreign sector. The existence of a balance-of-payments surplus or deficit will ultimately have much wider implications for the entire economic system in those chapters.

## CHAPTER PROBLEMS

**1.** Output is given by

$$Y = C + I + G + TB$$

where consumption ($C$), disposable income ($Y_d$), investment ($I$), government expenditure ($G$), and the trade balance ($TB$) are given as follows:

$$C = \overline{C} + (1 - s)Y_d$$

$$Y_d = Y - tY$$

$$I = \overline{I}$$

$$G = \overline{G}$$

$$TB = \overline{X} - (\overline{M} + mY_d)$$

This model differs from Section 17.1 by the introduction of $t$, the marginal tax rate.

**a.** i. Solve for the equilibrium level of income $Y_0$ as a function of exogenous variables.

ii. What is the open-economy fiscal multiplier, $\Delta Y_0/\Delta\overline{G}$? Is it larger or smaller than the multiplier in a closed economy, $1/s$? What is the intuitive explanation?

iii. Is the multiplier larger or smaller than the open-economy multiplier in Section 17.1? What is the intuitive explanation?

iv. What is the effect on the trade balance, $\Delta TB/\Delta\overline{G}$?

**b.** Assume that export demand increases exogenously by $\Delta\overline{X}$—for example, because of a devaluation that raises exports by $\Delta\overline{X} = \varepsilon\Delta E$ (think of $\varepsilon$ as the export elasticity times $\overline{X}/\overline{E}$)—and has no direct effect on imports in domestic currency (import elasticity is 1).

i. What is the effect on income, $\Delta Y/\Delta\overline{X}$?

ii. What is the effect on the trade balance, $\Delta TB/\Delta\overline{X}$? How does this answer compare with the elasticities approach and why?

iii. Assume (just for this question) that floating exchange rates are in effect so that $E$ always increases by the amount necessary to guarantee $TB = 0$. What is the floating-rate fiscal multiplier, $\Delta Y_0/\Delta G$? How does it compare with the fixed-rate and closed-economy multipliers in Problem a(ii)? What is the effect of a fiscal expansion on the exchange rate, $\Delta E/\Delta\overline{G}$?

**2.** This question concerns the relative virtues of the regimes of fixed and floating exchange rates in automatically stabilizing real growth in the economy. Assume that the goal is to minimize Variance ($\Delta Y$) in the presence of domestic disturbances $\Delta\overline{A}$ and foreign disturbances $\Delta\overline{X}$ (which are assumed to be independent of each other). The variance is a measure of variability that has the following three properties in general.

$$\text{Variance } (au) = a^2 \text{ Variance } (u)$$

$$\text{Variance } (b + v) = \text{Variance } (v)$$

$$\text{Variance } (u + v) = \text{Variance } (u) + \text{Variance } (v)$$

where $a$ and $b$ are parameters, or exogenous variables, and $u$ and $v$ are independent disturbances. Assume the simple Keynesian model of Section 17.1.

**a.** i. How does Variance ($\Delta Y$) depend on Variance ($\Delta\overline{A}$) and Variance ($\Delta\overline{X}$) under fixed exchange rates?

ii. Under floating exchange rates?

**b.** i. Which regime would be preferable if the variance of foreign disturbances is much larger than the variance of domestic disturbances?

ii. Which would be preferable if the two kinds of disturbances are similar in magnitude, and the country is very open ($m$ is large)? Which is a better candidate for a fixed exchange rate, Australia or Luxembourg?

**3.** Compute the ratio of the slope of the internal balance line, $YY$, to the slope of the external balance line, $BB$:

$$\frac{(\Delta E/\Delta\overline{G})\big|_{Y=\overline{Y}}}{(\Delta E/\Delta\overline{G})\big|_{TB=0}}$$

(*Hint*: The numerator refers to the change in $E$ that is required to offset a given change in $G$, in such a way as to leave $Y$ at the original level of $\overline{Y}$; it is given by

$$-\frac{\Delta Y}{\Delta\overline{G}}\Big/\frac{\Delta Y}{\Delta E}$$

The logic applies analogously to the denominator.) How is this ratio relevant to the assignment problem of Appendix B?

**4.** Choose a country. Read recent articles about its macroeconomy in the *Financial Times* or the *Economist*. Where on the Swan diagram (Figure 18.5) do you think this country falls?

## Extra Credit

**5.** In this question the interest rate is allowed to vary. (Think of it as having been held constant by monetary policy in the preceding problems.) In the preceding model, replace

the exogenous specification for investment, $I$, with an equation in which it depends inversely on the interest rate, $i$:

$$I = \bar{I} - bi$$

and add an equation for the demand for money. (We now use $M$ to stand for money.)

$$M/P = KY - hi$$

**a.** Derive the *IS* curve, giving $Y$ as an inverse function of $i$. [For notational simplicity, use $\alpha$ to denote the answer to 1a(ii).]

**b.** Combine your answer to 1a with the *LM* curve (the money demand equation, with real money demand $M/P$ equal to the exogenous real money supply $\bar{M}/\bar{P}$) to solve for $Y$ as a function of exogenous variables. Solve for $i$ as well.

**c.** What is the fiscal multiplier $\Delta Y/\Delta\bar{G}$ now? How does it compare with the answer to 1a(ii) (call it $\alpha$), and why? What happens if $h$ is very high (i.e., money demand is very sensitive to $i$)?

**d.** What is the monetary multiplier $\Delta Y/\Delta(\bar{M}/\bar{P})$? What happens if $h$ is very high?

## SUGGESTIONS FOR FURTHER READING

Johnson, Harry. "Toward a General Theory of the Balance of Payments" (1958). Reprinted in Jacob Frenkel and Harry Johnson, eds., *The Monetary Approach to the Balance of Payments* (Toronto: University of Toronto Press, 1976). The first half interprets the absorption approach ($TB = Y - A$) as pointing the way to the monetary approach to the balance of payments by emphasizing reserve flows. The second half develops the distinction between expenditure-switching and expenditure-reducing policies.

Krugman, Paul. *Adjustment in the World Economy,* Occasional Paper No. 24 (New York: Group of Thirty, 1987). Argues, using the logic of the transfer problem, that the U.S. trade deficit should not be eliminated by U.S. fiscal contraction alone, or even together with foreign fiscal expansion. Depreciation of the dollar is also needed.

Posen, Adam. *Restoring Japan's Economic Growth* (Washington, DC: Institute for International Economics, 1998). The experience of Japan in the 1990s suggests that the Keynesian model is not dead.

## APPENDIX A

### The Laursen-Metzler-Harberger Effect

When a devaluation worsens the terms of trade, there may be real consequences beyond the simple fact that purchasing power has fallen. This observation leads to the Laursen-Metzler-Harberger effect.

## Expenditure and the Terms of Trade

Up to now, we have assumed that the marginal propensities to save and consume are specified in domestic terms. (In Equation 17.3, $C$ and $Y$ were both defined in *domestic value* units.) This has meant that a change in the terms of trade between domestic output and foreign output has had no effect on the $NS - I$ schedule when the horizontal axis measures income in domestic terms, as in Figure 17.2. An increase in the exchange rate has affected only the $X - M$ line, shifting it up if the Marshall-Lerner condition is satisfied. One implication has been that the Marshall-Lerner condition is the necessary and sufficient condition for a devaluation to improve the trade balance. The change in income, and therefore imports, reduces the effect on the trade balance but does not reverse it.

However, there is little justification in theory for measuring income in domestic terms when determining saving. When the exchange rate rises, the terms of trade worsen. (The terms of trade are defined as the price of exports divided by the price of imports.) Any level of income given in domestic terms translates into less when measured in terms of foreign goods, or in terms of the appropriate consumption-weighted basket of domestic and foreign goods. If consumption, saving, and imports were proportional to income, it would not matter what numeraire we used for measurement. In the Keynesian model, however, a fall in income is hypothesized to induce consumers to reduce their consumption *less than proportionately*. In other words, the elasticity of consumption with respect to income is less than 1:

$$\frac{\Delta C/\Delta Y}{C/Y} = \frac{c}{(\bar{C} + cY)/Y} < 1$$

It is argued that a fall in real income, even if it results from a worsening in the terms of trade rather than from a fall in domestically measured income, should be reflected in a similar less-than-proportionate fall in real spending. If measurements are made in domestic terms, this is reflected as an increase in spending, or a decrease in saving, for any given level of income domestically measured. In other words, an increase in the exchange rate, in addition to shifting the $X - M$ schedule up, shifts the $NS - I$ schedule down, as in Figure 18.A.1. Consumers reduce their savings to maintain living standards in the face of the worsened terms of trade. This terms-of-trade factor is called the Laursen-Metzler-Harberger effect.

## The Condition for a Devaluation to Improve the Trade Balance

There are two implications of the Laursen-Metzler-Harberger effect. The first is that the fall in saving, or increase in expenditure, has a negative effect on the trade balance. Thus the trade balance could go into deficit (depending on the elasticities) even if the Marshall-Lerner condition is satisfied. That is the way Figure 18.A.1 is drawn. If we recall that the trade balance is equal to saving minus investment, it is intuitively clear why the Laursen-Metzler-Harberger effect would work to reduce the trade balance when it works to reduce saving.

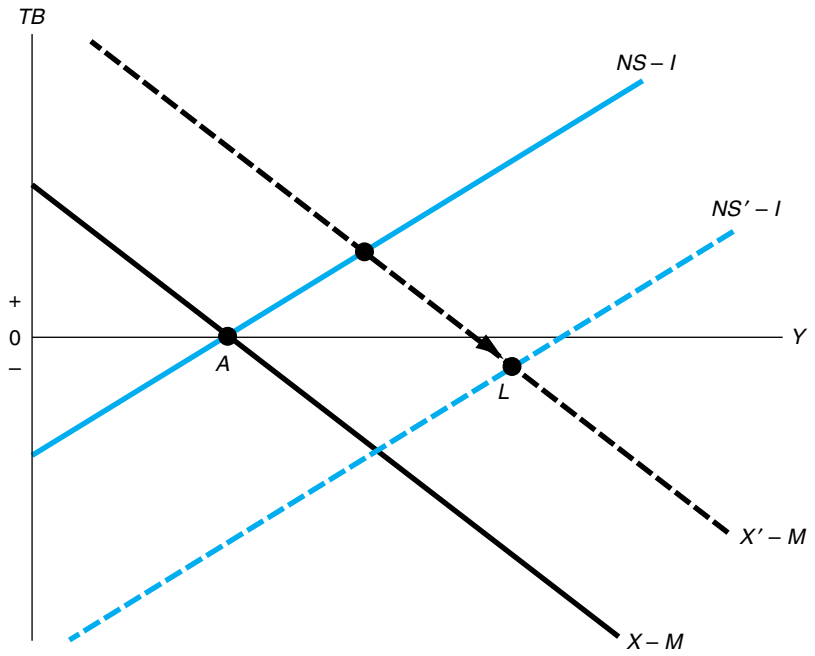
Evidently the necessary condition for a devaluation to improve the trade balance is more stringent than

$$\varepsilon_X + \varepsilon_M > 1$$

**FIGURE 18.A.1**

**Increase in the Exchange Rate with the Laursen-Metzler-Harberger Effect**

As usual, the devaluation shifts the $X - M$ line up. If the saving rate depends not just on income measured in domestic terms, $Y$, but also on the terms of trade, then the $NS - I$ line shifts down as households seek to protect their standard of living.




In the two-country context the necessary condition is

$$\varepsilon_X + \varepsilon_M > 1 + m + m^*$$

This condition will not be derived.[8] Note, however, that in addition to the price effects of the devaluation, the stimulus to domestic real income from increased exports will raise imports to an extent that depends on the domestic marginal propensity to import, and the fall in foreign real income from the fall in foreign exports will lower their imports to an extent that depends on the foreign marginal propensity to import. Thus the effect of the devaluation depends on the magnitudes of the elasticities compared to the marginal propensities to import.

## Implications for Transmission Under Floating Rates

The second implication of the Laursen-Metzler-Harberger effect has to do with the question considered in Section 18.1, of the international transmission of disturbances.[9] This is illustrated in Figure 18.A.2, with the economy initially at point $A$. It is no longer

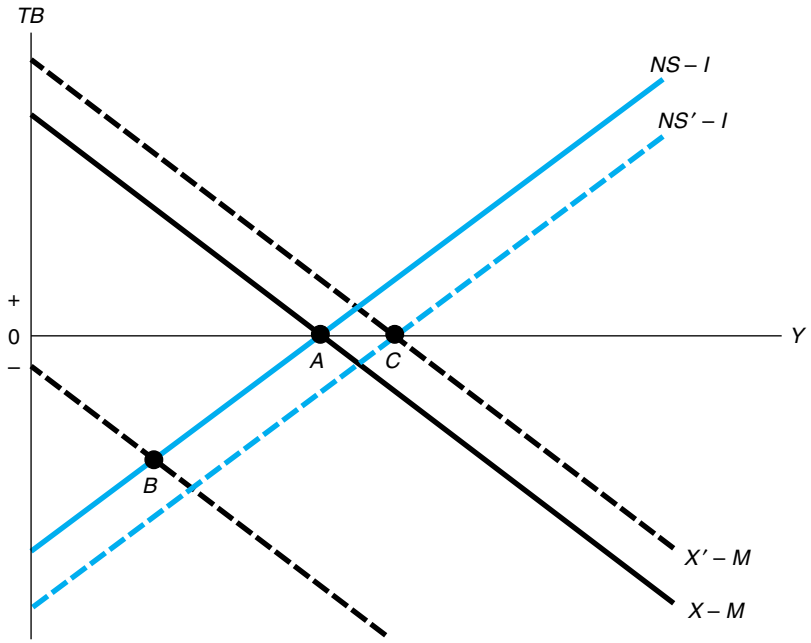
[8]The condition for a devaluation to improve the trade balance was originally derived by Arnold Harberger, "Currency Depreciation, Income and the Balance of Trade," *Journal of Political Economy* (February 1950): 1147–1160.

[9]The transmission of disturbances that occurs despite floating exchange rates was the motivation behind the original paper, Svend Laursen and Lloyd Metzler, "Flexible Exchange Rates and the Theory of Employment," *Review of Economics and Statistics*, 32 (November 1950): 281–299.

**FIGURE 18.A.2**

**External Disturbance Under a Floating Exchange Rate**

In the presence of the Laursen-Metzler-Harberger effect, a fall in foreign demand can actually raise domestic output. The reason is that the domestic currency depreciates, which causes saving to shift down.




true that a floating exchange rate completely insulates domestic output and employment from foreign disturbances. As before, a fall in exports due, for example, to a foreign contraction, leads to a depreciation to prevent the trade deficit that would otherwise emerge at point *B* in Figure 18.A.2. In the standard Keynesian model, the depreciation would increase exports and reduce imports, causing a return (instantaneously) to point *A*. With the Laursen-Metzler-Harberger effect, however, the worsened terms of trade cause saving to fall. Thus the $NS - I$ line shifts down, and a further depreciation is necessary if the trade balance is to avoid going into deficit. Equilibrium occurs when the depreciation is sufficient to restore the trade balance to zero despite the fall in saving, point *C* in Figure 18.A.2. This point occurs at a higher level of income than *A*, even though the chain of events began with a contraction of foreign income. The disturbance is transmitted in reverse.

## Temporary Versus Permanent Shifts in the Terms of Trade

The Keynesian consumption function on which the Laursen-Metzler-Harberger effect is based cannot be applied to long-run permanent changes in real income. When there is an adverse shift in the terms of trade, or any other reduction in real income, consumers can only reduce saving (or borrow) to maintain expenditure levels *if* conditions are expected to improve in the future, allowing the consumers to make up the lost savings (or pay back the loan). It has long been recognized that the marginal propensity to consume out of a permanent change in real income is higher than the marginal propensity

to consume out of a temporary change in income. The latter will be close to zero in the limit of a very short-lived change in real income, which has no effect on a rational individual's expectation of lifetime wealth or permanent income, and thus no effect on consumption plans.[10]

It is reasonable to think of standard Keynesian propensities to consume and save as applying in the intermediate case, in which a change in real income is observed but is not known to be necessarily either temporary or permanent. Thus the Laursen-Metzler-Harberger effect applies in this general, intermediate case. It should be modified, however, if there is additional information on the permanence of the change.[11]

One illustration was the sharp increase in the price of oil in 1973. For an oil-importing country, this was an adverse shift in the terms of trade analogous to a devaluation. One might have expected all oil-importing countries to incur large trade deficits because of the increase in their oil import bills. Yet the industrialized country that ran the largest deficit was Norway, which had North Sea oil reserves it could develop in the future. The Norwegians knew that their real income loss was temporary and that they would be wealthier in the long run. Accordingly, they reduced saving relative to investment, borrowing from the rest of the world to finance the development of their oil reserves. Norway's current-account balance declined by 7 percent of GDP from the period 1965 to 1973 to the period 1974 to 1979. Other oil importers who had little prospect that their loss in real income would be temporary had no choice but to adjust. The United States and Germany each had no change in their current-account positions between the two periods. They increased exports of other goods to pay for the higher oil import bill.

## APPENDIX B

### The Assignment Problem

Imagine a decentralized government in which the central bank determines the exchange rate and the treasury determines fiscal policy, and the two bodies do not coordinate policy effectively. Which agency, the central bank that sets $E$ or the treasury that sets $G$, should be responsible for external balance and which for internal balance? This question is known as the assignment problem.

---

[10]These ideas regarding the consumption function began with Milton Friedman's *permanent income hypothesis* and Franco Modigliani's *life-cycle hypothesis*. The appendix to Chapter 21 shows that a country of optimizing consumers will borrow from abroad if it can expect income to be higher in the future than today.

[11]The theory is updated to include explicit intertemporal utility maximization by consumers in Maurice Obstfeld, "Aggregate Spending and the Terms of Trade: Is There a Laursen-Metzler Effect?" *Quarterly Journal of Economics,* 96 (May 1982); and Lars Svensson and Assaf Razin, "The Terms of Trade and the Current Account: The Harberger-Laursen-Metzler Effect," *Journal of Political Economy,* 97, no. 1 (February 1983): 97–125. The first paper makes strong enough assumptions to rule out the Laursen-Metzler-Harberger effect.

Consider the consequences of assigning external balance to the central bank and internal balance to the treasury. Call this assignment Rule 1. Whenever the trade balance is in deficit, the bank raises $E$; whenever it is in surplus, the bank lowers $E$. Whenever output falls short of full employment, the treasury raises $G$; whenever it exceeds full employment, the treasury lowers $G$. The analysis will be pursued here in discrete time. Assume that the two agencies take turns. For example, the budget is drawn up and enacted only at yearly intervals, and the exchange rate is changed only in periodic devaluations or revaluations.

Start from point $P_1$ in Figure 18.5. Let the central bank go first. Because of the trade deficit, Rule 1 tells the bank to devalue until balanced trade is reached at $B_1$. Now the stimulus to net exports has moved the economy into the region of excess demand. When it is time to set the annual budget, Rule 1 tells the treasury to contract until internal balance is attained at $N_1$. However, the reduction in expenditure has created a trade balance surplus. The rule tells the central bank to revalue until balanced trade is restored at $B_2$. Now, however, unemployment means that the treasury will expand until reaching full employment again at $N_2$. Once again, a trade deficit tells the central bank to devalue, and the counterclockwise cycle repeats.

As the graph is drawn, the line spirals in on the equilibrium point, $A$, where the goal of simultaneous balance in both sectors is achieved. The reason for spiraling in rather than spiraling out is that the $YY$ schedule is steeper (in absolute value) than the $BB$ schedule. This claim can be demonstrated by making the slopes more extreme. Try this yourself: Draw the external balance schedule to be much steeper than the internal balance schedule. When Rule 1 tells the treasury to contract because of excess demand at point $B_1$, the trade surplus that opens up is larger than the initial imbalance. When the central bank revalues, the country moves farther away from internal balance than it was previously. This system is unstable, moving farther and farther from full equilibrium.

Now try Rule 2. External balance is assigned to the treasury. Whenever the trade balance is in deficit, the treasury cuts $G$; whenever it is in surplus, the treasury raises $G$. Internal balance is assigned to the central bank. Whenever output falls short of full employment, the central bank raises $E$; whenever it exceeds full employment, the bank lowers $E$. Starting from a point such as $P_1$, a reduction in $G$ leads to unemployment, an increase in $E$, and so forth. The path now progresses around the graph clockwise, not counterclockwise as under Rule 1. If the $YY$ schedule is the steeper one, as in Figure 18.5, there is a spiral *out*. Rule 2 does not work. Yet if the $BB$ schedule is steeper, there is a spiral in to equilibrium. Rule 2 works.

Thus the selection of the assignment rule should be based on the relative slopes of the schedules. Which case is more likely, a $YY$ schedule that is steeper than the $BB$ schedule, or one that is flatter? Problem 3 at the end of the chapter involves computing the relative slopes of the two lines. It turns out that the $YY$ line is steeper only if the economy is not very open to imports. In that case Rule 1 should be used: Fiscal policy should be used for internal balance. Otherwise—that is, for an economy that is highly open—fiscal policy should be assigned to external balance. Intuitively, if the marginal propensity to import is high, then expenditure-reducing policies are an effective way of

improving the trade balance because a high proportion of the eliminated expenditure would have gone to foreign goods. Mundell's principle of "effective market classification" states that policy tools should be assigned responsibility for those policy variables on which they have a relatively greater effect.

In practice, it may take time for policy makers to enact major policy changes. They should monitor economic conditions continuously and try to update their policies accordingly. If they are unable to do so, policy activism may exacerbate macroeconomic fluctuations rather than dampen them.