

CHAPTER 17

National Income and the Trade Balance

This chapter examines the interaction of income and the trade balance. We use the simple Keynesian multiplier model familiar from introductory macroeconomic textbooks but open up the model to international trade. This will turn out to make quite a difference.

Here *Keynesian* means simply that prices are assumed to be fixed (in terms of the currency of the producing country, as in Chapter 16) and therefore that changes in demand are reflected in output instead of price. This assumption is realistic for the short run, especially in an economy with unemployed labor and excess capacity. Empirical observation shows that prices are not perfectly flexible (to come in Chapter 19). In addition to the short-run realism, a second reason for continuing to hold prices fixed here concerns the structure of the remainder of the book. It helps to encounter new variables one at a time. Chapter 16 focused on the effect of changes in the exchange rate. This chapter adds the effect of changes in income. Only in Chapter 19 will we be ready for changes in the price level, followed by international capital flows and other factors. The introduction of all these variables at once would be quite confusing, so they will be introduced one by one.

17.1 The Small-Country Keynesian Model

In contrast to our assumption in Chapter 16, this section recognizes that import demand depends on more than just relative prices. (We continue to assume that suppliers fix prices in terms of their own currencies, so that the relative price of imports is simply the exchange rate, E .) Here we see that import demand also depends on income, Y .

$$M = M_d(E, Y) \quad (17.1)$$

The marginal propensity to import out of income¹ is represented by m .

$$M = \bar{M} + mY \quad (17.2)$$

¹From this point on, imports are defined in domestic, not foreign, units. In other words, if the economy is the United States, M (like Y and the other variables) is expressed in dollars. Because the price level is assumed to be fixed, this is the same as expressing everything in units of U.S. output: number of automobiles, bushels of wheat, and so on.

This linear import function is analogous to the standard Keynesian consumption function

$$C = \bar{C} + cY \quad (17.3)$$

where c is the marginal propensity to consume. The essence of the Keynesian consumption function is that households' consumption increases, but less than proportionately, in response to an increase in households' disposable income.

Equation 17.2 does not show the exchange rate explicitly because the first step will be to consider the case of a fixed exchange rate. Although many countries have highly variable exchange rates, there are several reasons for beginning with the case of a fixed exchange rate. First, it will provide a greater understanding of the 1950s and 1960s, when almost all countries had fixed exchange rates. Second, it will aid in understanding the many countries that, today, still have fixed exchange rates. Twelve European countries, for example, have adopted the ultimate mechanism for fixing their exchange rates (vis-à-vis each other) by joining the European Economic and Monetary Union (EMU) and adopting the euro as their currency, created in 1999. Third, it will make it easier to evaluate the frequently heard proposals to restore stability in exchange rates—from ambitious schemes for a complete return to firmly fixed rates to more moderate proposals for target zones.² Finally, with the exchange rate held fixed, it is easier to understand how the economy operates—before proceeding to what happens when the exchange rate can change.

The demand for exports (foreigners' imports) should be a function (analogous to Equation 17.1) of relative prices and foreigners' income, Y^* .

$$X = X_d(E, Y^*) \quad (17.4)$$

Most countries are small enough that, although developments in the rest of the world have important implications for the domestic economy, any impact of the domestic economy on the rest of the world can be safely ignored. Thus this section begins with the Keynesian small-country assumption that foreign income is exogenous. (This is in contrast to the very different *classical* small-country assumption, which is that relative prices are exogenous. That assumption is ruled out when export prices are set in domestic currency.) Now we have the simplified export demand function,

$$X = X_d(E)$$

or, staying with a fixed exchange rate for the moment,

$$X = \bar{X}. \quad (17.5)$$

In other words, exports are given exogenously. Thus, from Equations 17.2 and 17.5, the trade balance is given by

$$TB = X - M = \bar{X} - (\bar{M} + mY) \quad (17.6)$$

²Discussed in Section 27.6.

The Determination of Income

The definition of equilibrium in the Keynesian model is that output supplied, Y , is equal to output demanded. In the closed economy, demand comes from three sources: consumption by households (C), investment by firms (I),³ and spending on various goods and services by the government (G). In the simple Keynesian version with which this chapter begins, investment, like government expenditure, is taken to be exogenous (which is shown by a bar over the letter), even though consumption is endogenous. The open economy factors a fourth source of net demand for domestic goods—that coming from foreign residents—into the total demand for domestic goods. Net foreign demand for domestic goods is the trade balance, or net exports ($TB = X - M$). So the equilibrium condition is as follows:

$$\begin{aligned} Y &= C + I + G + X - M \\ &= \bar{C} + cY + \bar{I} + \bar{G} + \bar{X} - (\bar{M} + mY) \end{aligned}$$

Solving for the equilibrium level of income,

$$Y = \frac{\bar{A} + \bar{X} - \bar{M}}{s + m} \quad (17.7)$$

where, for notational simplicity, we have defined the exogenous component of aggregate demand as $\bar{A} \equiv \bar{C} + \bar{I} + \bar{G}$, and the marginal propensity to save as $s \equiv 1 - c$. (The part of each additional dollar of income that is not consumed must be saved.)

If government spending goes up by \$1 billion ($= \Delta \bar{G} = \Delta \bar{A}$), by how much does income go up? $\Delta Y = \$(1/(s + m))$ billion. The parameters s and m are fractions totaling less than 1 because imports are a subset of total consumption. It follows that the multiplier is greater than 1: An autonomous increase in spending of a given amount raises income by a greater amount. The explanation is that those who produce the goods and services to which the spending goes see an increase in their income and so raise their spending; this, in turn, raises the incomes of other producers, who raise their spending, and so forth. The infinite series has a finite sum for the same reason as in a closed economy: At each round of spending, some “leaks out” of the system through saving, so each round is smaller than the previous round. Notice that in the special case of a closed economy, where $m = 0$, the multiplier reduces to the familiar $1/s$, or $1/(1 - c)$. In general, however, the open-economy multiplier is less than $1/s$ because of a second leakage from the spending stream: through imports.

17.2 The National Saving-Investment Identity

To look at the Keynesian model graphically, it will be easier to work in terms of saving, which is equal to disposable income minus consumption, than in terms of consumption itself. To do so, first recognize that, in addition to decomposing GDP into the sectors to

³Investment includes not only additions to plant, equipment, and inventories by firms but also residential construction.

which the output is sold ($C + I + G + X - M$), an alternative is to decompose income from the viewpoint of those who earn it and dispose of it: consumption (C), saving (S), and taxes (T).⁴

$$\begin{aligned} C + S + T &\equiv \text{GNP} \equiv \text{GDP} + \text{NFI} \\ &= C + I + G + X - M + \text{NFI} \end{aligned}$$



NFI is net factor income, which includes investment income from abroad. Subtract C from both sides and rearrange.

$$S + (T - G) - I = X - M + \text{NFI}$$

Think of the government budget surplus ($T - G$) as government saving or, inasmuch as the number is often negative, think of the government budget deficit ($G - T$) as government “dissaving.” Define total national saving as $NS = S + (T - G)$. Then the equation is

$$NS - I \equiv CA \quad (17.8)$$

Equation 17.8 is called the National Savings Identity. It is described as follows: National saving exceeds investment by an amount equal to the current account balance, which is the rate of accumulation of claims on the rest of the world. Intuitively, all national saving, NS (whatever is left over after financing the government), goes into building up either the stock of capital or the stock of foreign claims. For example, beginning in the 1980s, a very low rate of U.S. national saving, consisting especially of high federal budget deficits, translated into high deficits in the current account balance, as Table 17.1 shows. In the late 1990s U.S. national saving increased because the federal budget deficit was eliminated, and indeed was turned into a surplus. But private saving remained low and investment rose faster than national saving. The result, by definition, was a rising current account deficit. Since 2001, record current account deficits have been associated with a return to large government deficits and low national savings.

Another way of viewing Equation 17.8 is in terms of the funds available to finance domestic investment, I . Investment must be financed either by the nation’s domestically generated savings, NS , or by funds made available for the use of the home country by the rest of the world, that is, foreign lending to finance the domestic trade deficit. In Italy most investment is financed domestically, whereas in the United States more investment is in effect financed abroad.

17.3 Multipliers

Now consider Figure 17.1, where the horizontal axis represents income, Y . The saving gap, $NS - I$, is an increasing function of Y , with slope s . Higher income means higher

⁴If we wish to include government transfers such as unemployment compensation and social security in the model, then T should be defined as taxes *net* of these transfers. If there are *international* transfers, they should also be added in along with NFI.

TABLE 17.1**U.S. National Saving, Investment, and Current Account**

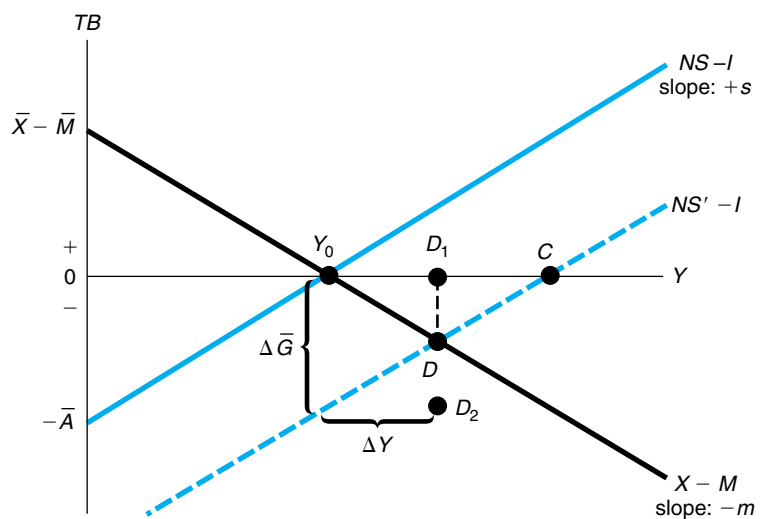
	Net Private Saving (% of GDP) (1)	Government Saving (% of GDP) (2) = (3) + (4)	State and Local Saving (% of GDP) (3)	Federal Saving (% of GDP) (4)	Net National Saving (% of GDP) (5) = (1) + (2)	Net Domestic Investment (% of GDP) (6)	Current Account (% of GDP) (7) \approx (5) - (6)
(average)							
1961–1964	9.9	1.4	0.9	0.5	11.2	10.4	0.8
1965–1968	10.6	0.7	0.9	-0.2	11.3	11.3	0.5
1969–1972	9.4	-0.4	0.8	-1.3	8.9	9.6	0.1
1973–1976	10.2	-1.6	0.6	-2.2	8.6	8.8	0.7
1977–1980	9.4	-0.9	0.6	-1.4	8.6	10.1	-0.1
1981–1984	10.3	-3.5	0.2	-3.7	6.8	8.2	-0.7
1985–1988	8.6	-3.1	0.4	-3.5	5.5	8.6	-2.8
1989–1992	7.5	-3.3	0.1	-3.4	4.2	6.2	-0.8
1993–1996	6.5	-2.7	0.2	-2.9	3.8	6.7	-1.3
1997–2000	4.9	1.2	0.5	0.7	6.1	8.5	-2.6
2001–2004	4.4	-2.4	-0.1	-2.2	2.0	6.6	-4.5

Note: "Net" means net of depreciation of the capital stock.

Source: National Income and Product Accounts, Bureau of Economic Analysis, U.S. Department of Commerce.

FIGURE 17.1**Fiscal Expansion in the Keynesian Model**

The saving-investment line slopes up because higher income, Y , means higher national savings, NS . An increase in government spending of ΔG shifts the line down. Point D is the new intersection with the $X - M$ line.



saving.⁵ The other line in the figure represents the trade balance, $X - M$, a decreasing function of Y , with slope $-m$ as given by Equation 17.6: Higher income means higher imports. Equation 17.8 states that equilibrium occurs where the two lines cross. Figure 17.1 shows the initial intersection as occurring when saving equals investment and exports equal imports. But the choice of this location is arbitrary; equilibrium could occur as easily above or below the zero axis.

The Multiplier Effect of a Fiscal Expansion

Let us consider as our first experiment a fiscal expansion $\Delta\bar{G}$. It shifts the $NS - I$ line down by that amount because $NS = S + (T - G)$. It raises equilibrium income to point D , the intersection on the new line $NS' - I$ in Figure 17.1. Notice in the graph that the change in income is less than in the closed-economy case: A closed-economy equilibrium would occur where the $NS' - I$ line crosses the zero axis at point C , which lies farther to the right than D .

The multiplier for government spending, or for other autonomous components of spending, follows from Equation 17.7:

$$\frac{\Delta Y}{\Delta A} = \frac{1}{s + m} \quad (17.9)$$

Again, $\Delta Y/\Delta\bar{G}$, the multiplier effect on income, is smaller in the open economy than in the closed economy because there is leakage through imports in addition to the leakage through saving. The multiplier formulas could also be derived geometrically. (See Problem 3 at the end of the chapter.)

The convenient aspect of this graph is that it depicts not only income, Y , measured on the horizontal axis, but also the trade balance, $TB = X - M$, measured on the vertical axis. In Figure 17.1, the fiscal expansion pushes the trade balance into deficit because the higher income draws in more imports. Algebraically,

$$\Delta TB = -\Delta M = -m\Delta Y$$

Now use the multiplier, from Equation 17.9, to substitute for ΔY .

$$\Delta TB = -\frac{m}{s + m}\Delta\bar{G} \quad (17.10)$$

Equation 17.10 shows that the effect of a fiscal expansion on the trade balance is clearly negative.

In short, the trade balance has been *countercyclical* in the United States, as in most countries. Historical swings in the U.S. trade balance reflect the economy marching up and down the $X - M$ line in Figure 17.1. In the macroeconomic expansions of the

⁵If it is recognized that tax revenues, T , depend positively on income, then the slope of NS is higher than s (by the amount of the marginal tax rate). For simplicity in what follows, taxes will be treated as if they were exogenous. The marginal tax rate is introduced, however, in problem 1 of Chapter 18. We also ignore the distinction between the current account and trade balance in Figure 17.1; that is, we assume away investment income and international transfers.

1976–1978, 1983–1989, 1992–2000, and 2002–2005 periods, imports rose and the trade deficit widened (as at point *D*). In the recessions of 1980, 1990–1991, and 2001, the trade deficit shrank.

The Multiplier Effect of an Increase in Exports

Now consider the effect of a devaluation. Assume that the Marshall-Lerner condition is satisfied. This analysis could apply equally well to other exogenous sources of improvement in the trade balance, such as a shift in tastes away from foreign goods or an exogenous increase in foreign income. Algebraically, these changes are represented as an increase in $\bar{X} - \bar{M}$. Graphically, they are represented as an upward shift in the $X - M$ line by the distance $\Delta\bar{X}$ in Figure 17.2.⁶ If changes in income could somehow be ignored (as in Chapter 16), the trade balance would improve by the vertical distance $\Delta\bar{X}$. The magnitude of $\Delta\bar{X}$ depends on the magnitude of the devaluation and of the elasticities. An elasticity of 1, for example, would imply that exports increase by the same percentage as the devaluation.

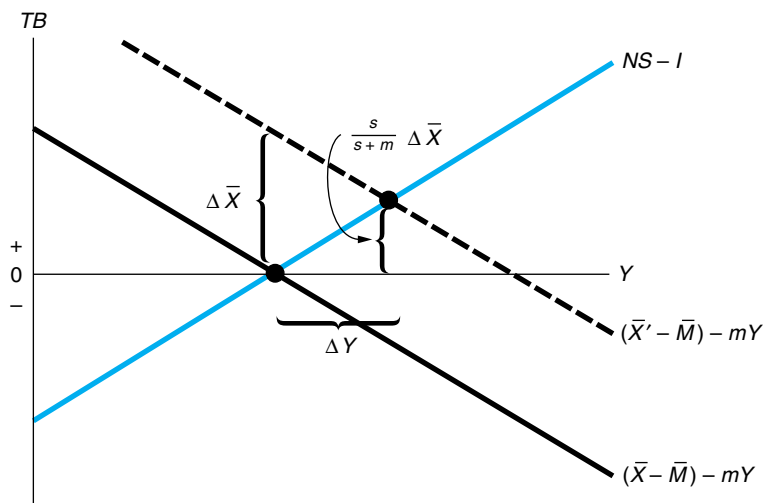
In addition to the obvious effect of raising the trade balance, however, the devaluation stimulates income. Algebraically, from Equation 17.7,

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

FIGURE 17.2

Devaluation in the Keynesian Model

The devaluation shifts up the $X - M$ line (assuming the Marshall-Lerner condition is met). Income, Y , rises. The trade balance also rises, but less than it would if income were held constant.



⁶For simplicity, the exogenous increase in net exports is represented by $\Delta\bar{X}$, even though it could be a fall in imports as well as a rise in exports. One might want to think of the special case where the import elasticity is 1, so total import spending is unaffected by changes in the exchange rate, and the entire improvement in the dollar trade balance comes from export earnings X .

The higher income means higher imports, according to the marginal propensity to import, and so the improvement in the trade balance is less than if income were held fixed.

$$\begin{aligned}\Delta TB &= \Delta \bar{X} - m\Delta Y \\ &= \Delta \bar{X} - m \frac{1}{s+m} \Delta \bar{X} \\ &= \frac{1}{s} \Delta \bar{X}\end{aligned}\tag{17.11}$$

The key point is that $\frac{1}{s+m} < 1$; the trade balance improves by less than the full exogenous increase in net exports because of the higher imports that are drawn in by higher income. Yet the effect is still positive: Imports do not go up as much as exports.

17.4 The Transfer Problem

Our model can be applied to an old problem in international macroeconomics. As was discussed in Section 3.4, the transfer problem originated with war reparations payments, such as those from Germany to France after World War I; yet it can be applied whenever there is a transfer of income from one country to another. More recent examples abound. The OPEC price increase at the end of 1973 could be modeled as an exogenous transfer from the oil-importing countries to OPEC. The 1982 international debt crisis could be modeled as an exogenous transfer from debtor countries to creditor countries (the transfer is the increase in debt-service requirements). The 1991 payments from Japan, Germany, Saudi Arabia, Kuwait, and other countries to the United States in connection with military operations against Iraq constitute the best example because they were literally unilateral transfers in the balance of payments.

The important issue is the extent to which the recipient country will spend the transfer on imports and the transferor will cut back on its imports. Recall that the current account is defined as the balance of trade on goods and services *plus* transfers received (or minus transfers paid). Let us consider a small country that has just received a transfer. If it spends the entire transfer on imports and its trade balance worsens by precisely this amount, then the overall current account is unchanged at the existing exchange rate. In this case, the transfer is considered “fully effected,” meaning that the *financial* transfer leads to the intended matching transfer of *real goods*. If the recipient spends most of the money on its *own* goods, its overall current account will improve at the old exchange rate—the negative effect on the trade balance will be smaller than the transfer. In this case the transfer is “undereffected.”

Now consider a country making a transfer T , say Saudi Arabia in 1991.⁷ We saw in the model of Chapter 3 that a transfer may or may not be undereffected. In the

⁷Here it is assumed for simplicity of notation that the money for the transfer is raised by taxation of the public, T .

Keynesian model, however, the transfer is *necessarily* undereffected.⁸ The change in the trade balance is less than the transfer. Why?

Recall the National Saving Identity, Equation 17.8:

$$NS - I \equiv CA$$

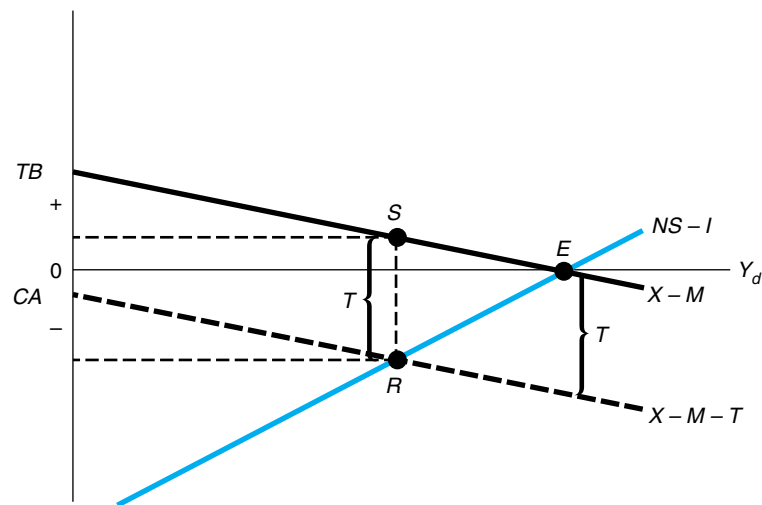
If the government finances the transfer with taxes, the budget balance is unchanged. Given that I is exogenous, if S were also unchanged it would follow from the National Saving Identity that the trade balance would increase by exactly the transfer, T . But disposable income falls by the amount of the transfer. In a Keynesian model, that leads to a fall in S . Therefore the trade balance must rise by less than the transfer.

The point is demonstrated graphically in Figure 17.3. Note that the horizontal axis is disposable income Y_d , not GDP, because both saving and imports depend on Y_d , not Y , once the distinction is acknowledged. The current account, CA , depends on disposable income with the same slope as the trade balance ($-m$, the marginal propensity to import). If there is no transfer, then the trade balance coincides with the current account. An outward transfer, T , shifts the CA line down. Saving-investment equilibrium is given at point R , where the new CA line intersects $NS - I$. At this lower level of disposable income, imports have fallen and thus the trade balance is in surplus at point S . Yet the trade balance, TB , is not as large as the outward transfer, T . The overall current account, $CA = TB - T$, necessarily goes into deficit at point R . So long as the $NS - I$ curve is not flat—that is, so long as the marginal propensity to save is greater than zero—the transfer is undereffected.

FIGURE 17.3

Transfer Worsens the Total Current Account

A transfer, T , to a foreign country improves the domestic trade balance, $X - M$, because imports fall when domestic disposable income falls. Nevertheless, in the Keynesian model the overall current account, $X - M - T$, falls.



⁸The first to show this was not Keynes, but Lloyd Metzler, "The Transfer Problem Reconsidered," *Journal of Political Economy* (June 1942): 397–414.

17.5 For a Large Country: The Two-Country Keynesian Model

So far we have assumed exports to be exogenous with respect to income. This section relaxes that assumption, taking into account how exports depend on developments in the rest of the world. In the examination of a large country, developments in the rest of the world, in turn, depend on developments in the home country. The rest of the world, which we aggregate into a single foreign country, and the home country are interdependent.⁹

Repercussion Effects

If income, Y^* , increases in the foreign country, foreigners import more from the home country.

$$X = \bar{X} + m^*Y^*$$

The foreign marginal propensity to import is represented by m^* . In Equation 17.7, \bar{X} is replaced by the new expression for exports, resulting in the new formula for equilibrium income.

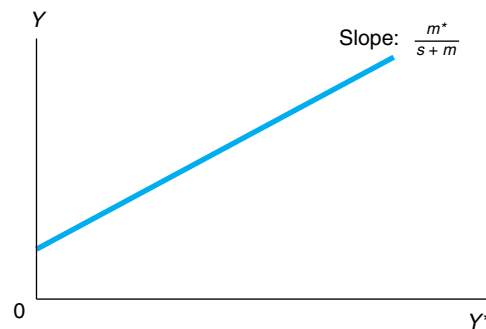
$$Y = \frac{\bar{A} + \bar{X} - \bar{M} + m^*Y^*}{s + m} \quad (17.12)$$

Obviously, domestic income depends positively on foreign income. Figure 17.4 graphs this relationship. The slope $\Delta Y/\Delta Y^*$ is $m^*/(s + m)$, which is less than 1 unless the foreign country is much more open to imports than the home country.

The relationship explains how expansion in one country is transmitted to its trading partners through the trade balance. For example, in 1977–1978 the United States pressured Germany and Japan to expand their economies. The plan, known as the locomotive theory, was to help pull the rest of the world out of recession. Often the United

FIGURE 17.4
Transmission from Foreign Income to Domestic Income

When foreign income, Y^* , rises, imports into the foreign country rise—that is, exports from the domestic country rise; as a result, domestic income, Y , also rises.



⁹The Keynesian two-country model was developed by James Meade, *The Theory of International Economic Policy*, Vol. I: *The Balance of Payments* (London, Oxford University Press, 1952), Chapters 4 and 5.

States has been the locomotive pulling the world out of recession. In each episode, the smaller, more open, and developing countries were anxious for the big industrialized countries to expand because the economies of the smaller countries depend particularly on foreign income. Of course, contraction is transmitted across countries, as well. The prime example is the Great Depression of the 1930s, when declining income in one country would result in declining imports, and thus declining income, among its trading partners.

Now we are ready to drop the assumption that foreign income is exogenous. The rationale has been that the domestic economy is too small to affect foreign income. However, when a country as large as the United States (or the European Union or Japan) expands, and consequently imports more from its trading partners, those imports are a large enough component of world demand to raise income and expenditure significantly among the trading partners. Then a large enough fraction of the foreign expenditure is spent on domestic goods, so that foreigners' imports from the home country in turn rise significantly. In other words, part of the spending that leaks out, flows back. The result is that income increases in the home country, the place that began the expansion, by more than one would expect based on its spending alone (the model in Section 17.1). The feedback through the trading partner can be called a repercussion effect. To model the repercussion effect, we now consider two countries that are each large enough to affect the other's income.

The Solution to the Two-Country Model

To make foreign income endogenous, the foreign country is modeled analogously to the home country, recognizing that its exports are the home country's imports. That is, they are a function, $\bar{M} + mY$, of the home country's income. Similarly, its imports are the home country's exports; they are a function, $\bar{X} + m^*Y^*$, of the foreign country's income. Then the solution for equilibrium foreign income is

$$Y^* = \frac{\bar{A}^* + \bar{M} + mY - \bar{X}}{s^* + m^*} \quad (17.13)$$

where \bar{A}^* represents the autonomous components of foreign expenditure and s^* the foreign marginal propensity to save. This is simply the other country's version of Equation 17.12.

Equilibrium income for each country is indicated algebraically by solving the two equations simultaneously.¹⁰ The multiplier for a domestic expansion turns out to be

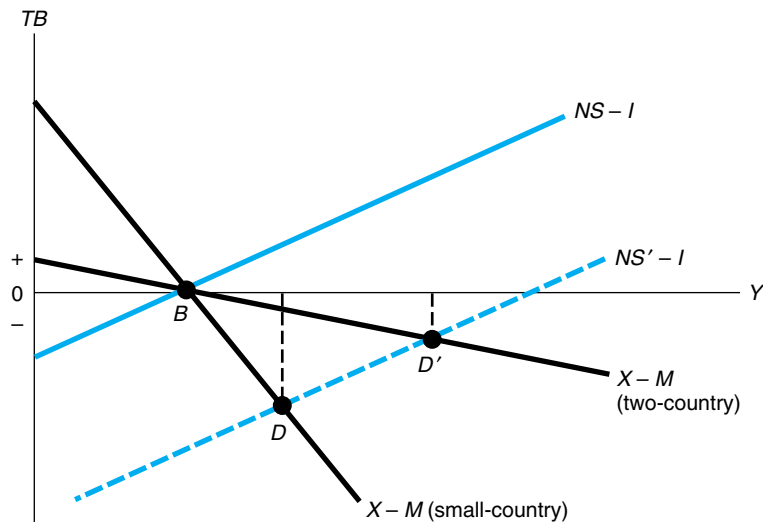
$$\frac{\Delta Y}{\Delta A} = \frac{1}{s + m - \frac{m^*m}{s^* + m^*}} \quad (17.14)$$

The important point is that it exceeds the small-country multiplier $\frac{1}{s + m}$ derived in Section 17.1. (In terms of either Figure 17.5 or the appendix figure, the expansion

¹⁰You are asked to do this in Problem 8a at the end of the chapter. Also see the appendix.

FIGURE 17.5
Repercussion Effect
Increases the Multiplier

The effect of a fiscal expansion is greater in the two-country model (point D'), than in the small-country model (point D) because some of the spending that leaks out of the country through imports leaks back in through exports.



results in a move to the new intersection at D' , whereas the intersection would be at point D if foreign income, Y^* , were kept constant.) Why? Some of the expenditure stream that leaks out as imports now returns as exports. For every dollar increase in domestic income, imports go up by m ; because the other country's exports go up by m , its income goes up by $\frac{m}{s^* + m^*}$, and so it imports more from the home country. This effect is represented by the term $(m^*m)/(s^* + m^*)$ in Equation 17.14. Because it reduces the denominator, it increases the multiplier. The small-country multiplier is the special case where a negligibly small proportion of foreign expenditure falls on domestic goods ($m^* \approx 0$), so this term can be ignored. Conversely, the multiplier is still necessarily *less* than the closed-economy multiplier, $1/s$, as long as m and $s^* > 0$. It is not possible for all of the expenditure that leaks out through the trade balance to come back, as long as any foreign income is saved.

We can continue to use a version of the $X - M = NS - I$ graph of Figure 17.1. Because

$$\Delta TB = m^* \Delta Y^* - m \Delta Y \quad (17.15)$$

we can substitute

$$\Delta Y^* = \frac{m}{s^* + m^*} \Delta Y$$

from Equation 17.13 and so find the new slope of the $X - M$ line:

$$\begin{aligned} \Delta TB &= \left(m^* \frac{m}{s^* + m^*} - m \right) \Delta Y \\ \Delta TB / \Delta Y &= -\frac{ms^*}{s^* + m^*} \end{aligned} \quad (17.16)$$

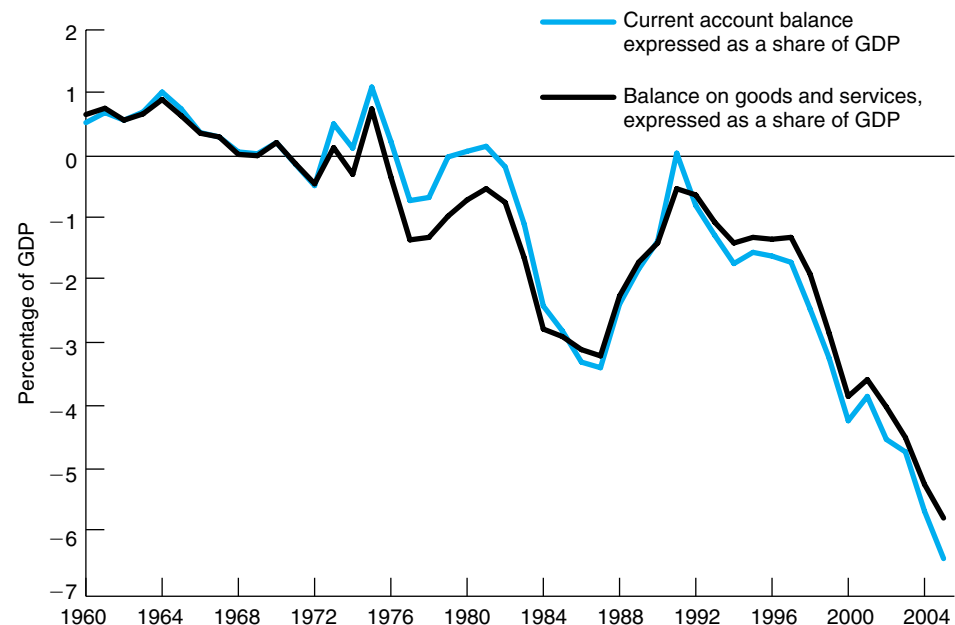
Notice that the slope is close to $-m$, the slope of the TB line in the small-country case, if m^* is small. In general, however, the slope is less in absolute value than $-m$, as evidenced in Figure 17.5. It is possible to see from the intersection with the $NS' - I$ line at point D' the proposition already shown algebraically: An expansion (rightward shift of $NS - I$) has a greater effect on domestic income in the two-country model than in the small-country model because there is less leakage through the trade deficit.

Empirical Evidence on Growth and Import Elasticities

Figure 17.6 shows the U.S. balances for goods and services and the current account (as shares of GDP) for the last half century. In the 1970s the trade balance went into deficit for the first time since World War II, but it was small enough that the current-account balance still averaged zero. More recently, however, the trade deficit has far exceeded its previous record. These large trade deficits have generated concern throughout the U.S. economy. They represent lost output and employment in those sectors or firms that rely on overseas customers for a rising share of their sales, as well as in those sectors or firms that face tough competition from rapidly rising imports. Furthermore, the equally large current-account deficits mean that the country is rapidly going into debt to foreign investors. Members of Congress and editorial writers rail against the deficits, some adopting protectionist views. Why have these deficits occurred?

FIGURE 17.6

U.S. Trade Balance and Current Account Balance, 1946–2005



Source: Department of Commerce (Bureau of Economic Analysis).

Part of the answer is that in 1983–1984, and again in 1992–2000 and 2002–2005, the United States was expanding more rapidly than were its trading partners. As is seen from Equation 17.15, if the home country expands faster than the foreign country, the home country suffers a worsening trade balance—assuming that the two countries have the same marginal propensity to import.

What happens if both countries expand together, i.e., if income growth is equal? If the two countries have the same elasticities of import demand with respect to income, then there is no effect on the trade balance. The elasticity of demand with respect to income is the marginal propensity to import ($m = \Delta M/\Delta Y$) divided by the ratio of imports to income: $(\Delta M/\Delta Y)/(M/Y)$. The usual way to think of it is the *percentage* change in imports that results from a given *percentage* change in income, $(\Delta M/M)/(\Delta Y/Y)$. There is evidence that imports are more elastic with respect to income in the United States than they are in many of its trading partners.¹¹ The developing countries and Japan have lower income elasticities.

One implication that follows for developing countries and any other countries exporting goods that face highly income-elastic demand is that their incomes tend to be procyclical: When the world is in recession, demand for their goods tends to fall more than demand for goods produced by other countries, and so their incomes fall more than proportionately. The high variability in income is particularly severe for developing countries producing a single commodity, such as copper or oil, that serves as an intermediate input in other countries' production processes with little scope for substitution.

A second implication would also follow if these elasticities were assumed to apply to long-run, as well as short-run, changes in income: There will be a long-run secular trend in the trade balance in favor of these countries and against the United States, and other producers of manufactured goods, who face demand that is less income-elastic. Indeed, this could be part of the explanation for the long-term trend toward deficit in the U.S. trade balance reported in Figure 17.6.

It has been suggested, however, that the long-term income elasticities are in reality not as high as the short-term elasticities when care is taken to separate long-term growth in income from exogenous trends such as increased supply capacity in the newly industrialized countries. Some have discerned a secular trend in trade adverse to the raw materials produced by developing countries. The NIEs, such as Hong Kong, Singapore, South Korea, and Taiwan,¹² have achieved strong trade positions through policies of growth led by exports—not of traditional raw materials but of manufactured goods, beginning with labor-intensive manufactures such as textiles and elec-

¹¹Some empirical evidence on how the income elasticities of import demand vary across countries was presented in a famous paper by Hendrik Houthakker and Stephen Magee, "Income and Price Elasticities in World Trade," *Review of Economics and Statistics*, 51, no. 2 (1969): 111–124.

¹²These four entities are sometimes called newly industrialized economies, or NIEs, instead of NICs, in deference to the People's Republic of China, which retook responsibility for the British colony of Hong Kong in 1997 and has never recognized the independence of Taiwan.

tronics. The pattern that fits them best—and now China—is the product cycle.¹³ For any given technology, a secular trend exists against the United States and in favor of those countries able to adopt the technology to produce the same goods at lower cost. Yet the United States and other technological leaders have always innovated and stayed one step ahead, at least up until now.

17.6 Summary

This chapter added a second factor, national income, or GDP, to the exchange rate in the determination of the trade balance. When income increases, the demand for imports increases, and that, in turn, works to decrease the trade balance. Because the trade balance is a component of income, the determination of both variables must be considered simultaneously.

Because we have maintained the assumption that the prices of domestic goods are fixed (in terms of domestic currency), the resulting model is Keynesian: Changes in demand are reflected in output, not in prices. This assumption is more realistic in the short run than the long run.

The most important conclusions were evident even in the simplest form of the model where the level of foreign income is held constant. This form is realistic given the assumption that the domestic country is too small to affect foreign income. The first conclusion concerned changes in government spending: (1) Such changes have a multiplier effect on national income because at each round of spending some proportion of the income earned is passed on in a new round of spending; but (2) the effect on income is smaller than in closed-economy textbooks because at each round of spending some income leaks out of the country in the form of higher import spending and a higher trade deficit. Feedback effects via foreign income, which only need be taken into account if the home country is large, work to increase the effect of an expansion on domestic income.

The next conclusions concern devaluations: (3) If the Marshall-Lerner condition is met, a devaluation will raise the trade balance, as in Chapter 16,¹⁴ and this in turn will improve income because of the multiplier, but (4) because the higher income means higher imports, the increase in the trade surplus will be less than it was when income effects were omitted.

Other important questions can also be explored with the simple Keynesian model. (5) When a country makes an exogenous transfer to its trading partner (reparations, foreign aid, or interest payments), it will generally experience an improvement of its trade balance that is smaller than the amount of the transfer; thus, its total current account will deteriorate (at a given exchange rate). Chapter 18 will consider further applications.

¹³See the discussion of the product cycle in Chapter 9.

¹⁴The appendix to Chapter 18 explores a qualification to this conclusion that arises if saving depends on the terms of trade the “Laursen-Metzler-Harberger” effect.

CHAPTER PROBLEMS

1. In the Keynesian multiplier process, at each round of spending some proportion of the income is passed on by its recipients as a new round of spending. The number of rounds is infinite. Does this mean that the total effect on income is infinite? Why not?
2. The multiplier is greater than 1 if $s + m < 1$. Does this condition hold? Do you think $M < C$ or $M > C$? Why?
3. Look carefully at the geometry of Figure 17.1.
 - a. What is $\Delta\bar{G}$ divided by Y_0C , that is, by the horizontal distance from point Y_0 to point C ? (Remember the definition of the slope of a line.) Then what is $Y_0C/\Delta\bar{G}$? What have you just shown about the fiscal multiplier in a closed economy?
 - b. What is the vertical distance D_2D , expressed relative to ΔY ? What is the distance D_1D , expressed relative to ΔY ? Now take the sum of the two vertical distances: What is $D_1D_2/\Delta Y$? Then what is $\Delta Y/\Delta\bar{G}$? What have you just shown about the multiplier in an open economy? How does it compare to the answer in (a), and why, intuitively?
4. Would you expect the multiplier to be highest in Australia, Luxembourg, or Singapore?
5. Consider an increase in a country's budget deficit.
 - a. What must happen to private saving, investment, or the current account, according to the national saving identity?
 - b. In the Keynesian model (leaving out any interest rate effects on investment), which of these alternatives, or what combination of them, results from a tax cut? What is the answer if investment is allowed to depend on the interest rate (as at the end of Chapter 18)?

(For parts c–e, assume tax revenue depends on income, as in footnote 5 or Problem 1 of Chapter 18.)

 - c. If there is a recession because of an exogenous fall in C , what is the effect on the budget deficit? Are the effects on private saving and the trade balance the same as in 5b?
 - d. If there is a recession because of an exogenous fall in exports, what are the effects on the budget deficit, saving, and the trade balance?
 - e. Are your answers to question b consistent with your answer regarding the national saving identity in question a?
6. This question concerns the Keynesian model.
 - a. Recall that the definition of equilibrium is that output supplied is equal to output demanded:

$$Y = A + TB$$

where Y = Output
 A = Aggregate Demand, and
 TB = Trade Balance

Assume that Aggregate Demand is given by

$$A = \bar{A} + cY_d,$$

$$TB = \bar{X} - \bar{M} - mY_d$$

and disposable income is given by

$$Y_d = Y - \bar{TP}$$

where \bar{TP} = tax payments, here assumed exogenous.

Solve for equilibrium output.

- b. What is the tax multiplier $\Delta Y / \Delta \bar{TP}$? In this Keynesian model, how does the effect of a tax cut compare to the effect of an increase in government spending? Why?
 - c. In the mid-1990s, the U.S. government advised Japan to cut taxes, to revive economic growth. The Japanese government rejected the advice, arguing that the multiplier effect would be very small. What do you think were the grounds for its argument?
7. Consider a new transfer ΔT made by a small country to abroad, say by Saudi Arabia in 1991. The question posed by the transfer problem is the net effect on Saudi Arabia's current account.

The three lines in Figure 17.3 are represented by three equations:

$$NS - I = -\bar{A} + sY_d$$

where \bar{A} includes all exogenous components of domestic spending;

$$TB = \bar{X} - \bar{M} - mY_d; \text{ and}$$

$$NS - I = CA = TB - T$$

Solve for:

- a. ΔY_d . This is the change in disposable income, equal to the change in output minus the change in the transfer.
 - b. ΔTB .
 - c. ΔCA . Is the transfer undereffected or overeffected, or does it depend on the parameters?
8. This question concerns the two-country model.
- a. Solve Equations 17.12 and 17.13 simultaneously, to determine Y .
 - b. Use Equations 17.16 and 17.14 to solve for the effect of a spending rise on the trade balance:

$$\frac{\Delta TB}{\Delta A} = \frac{\Delta TB}{\Delta Y} \frac{\Delta Y}{\Delta A}$$

- c. Compare your answers in b with the analogous expression in the small-country model. In which case is the fall in the trade balance greater and why?

9. In Section 17.4 we applied the transfer problem to a small country, but the problem is more often applied to two countries of approximately equal size (such as France and Germany).
- The transfer, ΔT , can be viewed as an exogenous decrease in the income of the transferring country *and* an exogenous increase in the income of the recipient country. The answer to 8b gives the effect of the first factor on the trade balance, and the analogous equation for the foreign country gives the effect of the second factor. Show that

$$\frac{\Delta TB}{\Delta T} = \frac{ms^* + m^*s}{s^*s + ms^* + m^*s}$$

- Is the ratio necessarily less than 1? What if the marginal propensities to save are zero? How would the special case when the domestic country is so small that the foreign country spends almost nothing on its goods look?
- Show the effect on the current account, $\Delta CA = \Delta TB - \Delta T$. Does the current account of the transferor improve or worsen?

SUGGESTIONS FOR FURTHER READING

- Goldstein, Morris, and Mohsin Khan. "Income and Price Effects in Foreign Trade." In Ronald Jones and Peter Kenen, eds., *Handbook of International Economics*, Vol. II (Amsterdam: Elsevier, 1985), Chapter 20, pp. 1041–1105. Econometric estimates of the elasticities of demand for imports and exports, including the distinction between short- and long-run elasticities of demand with respect to income.
- Hooper, Peter, and Jaime Marquez. "Exchange Rates, Prices and External Adjustment in the United States and Japan." In Peter Kenen, ed., *Interdependence and the Macroeconomics of the Open Economy* (Princeton: Princeton University Press, 1995). Empirical analysis of the U.S. trade deficit and Japanese surplus.
- Sachs, Jeffrey. "The Current Account and Macroeconomic Adjustment in the 1970s," *Brookings Papers on Economic Activity*, 1 (1981), pp. 201–268. A clear exposition of the current account as the outcome of a two-period saving decision (as in the appendix to Chapter 22), with special reference to the oil shocks of the 1970s and countries' responses.

APPENDIX

The Two-Country Model in Graphical Form

Figure 17.A.1 presents graphs of the two simultaneous equations: Equation 17.12, which gave Y as a function of Y^* , and Equation 17.13, which gave Y^* as a function of Y . The latter graph is analogous to Figure 17.5. It must be turned on its side in Fig-

FIGURE 17.A.1
Simultaneous Solution for Both Countries' Incomes

A relationship runs from domestic income, Y , to foreign income, Y^* . A domestic expansion shifts the domestic line up so that the new intersection occurs at D' . The increase in Y is greater than in the small-country model—which ignored the repercussion effect of higher income abroad (point D).

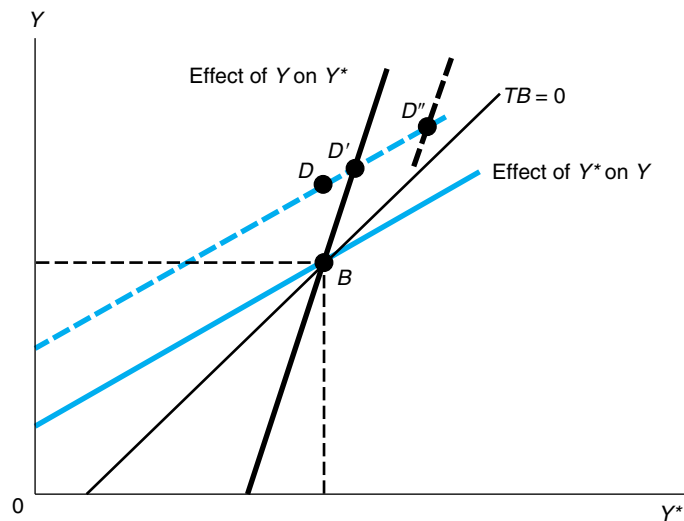


Figure 17.A.1 to show it on the same axes as Figure 17.5. Equilibrium income for each country is indicated graphically at the intersection of the two lines, point B .

Consider now an increase in domestic spending. In terms of Figure 17.5, the domestic income line shifts up vertically by the amount of the simple open-economy multiplier (the amount Y would rise if we were still holding Y^* constant). The expansion results in a move to the new intersection at D' , whereas the intersection would be at point D if foreign income, Y^* , were kept constant. Why? As we learned in Section 17.5, the multiplier is larger in the two-country model because of the repercussion effect.

Figure 17.A.1 can also be used to illustrate the point about an adverse trend in the U.S. trade balance. The line that gives U.S. income, Y (as a function of foreign income, Y^*), shifts out faster than the line that gives foreign income (as a function of U.S. income). In terms of Equations 17.12 and 17.13, \bar{A} increases faster than \bar{A}^* . The intersection moves up faster than it moves to the right. At point D'' it lies above the trade balance equilibrium schedule (the slope of which is m^*/m , as we can see by setting $\Delta TB = 0$ in Equation 17.15). The United States goes into deficit because its imports go up faster than do those of its trading partners.

