

CHAPTER 20

Developing Countries and Other Small Open Economies with Nontraded Goods

Imagine the dilemma faced by the finance minister of a small developing country that needs to improve its trade balance. Advisers urge that some combination of devaluation and contractionary demand policies be adopted. They base their reasoning on standard macroeconomic models such as the ones developed in the preceding chapters.¹ The finance minister has little faith in these models, believing that they were designed to fit the experience of relatively large industrialized countries, not small developing countries. But the finance minister also does not believe the simple small-country monetarist model developed in Chapter 19.² A bit more realism is required. This chapter departs temporarily from the central focus of the text to consider an alternative model that is particularly appropriate for typical developing countries.

If a country were so open to international trade and so small in world goods markets that purchasing power parity held, then, by definition, a devaluation could not change relative prices. As we saw in Section 19.4, a devaluation could affect the trade balance only through the real money balance effect. Hong Kong and Singapore were cited as relatively close approximations of such an economy.

Even countries that are small in terms of world trade often have large internal markets, however. Indonesia and Australia, for example, are probably too small in world markets to affect their terms of trade, but they are certainly not “small” countries in other respects. This chapter will continue to consider countries that are sufficiently small and open that they take the prices of all traded goods (exports and imports) as determined outside the country and fixed in terms of foreign currency. However, the existence of goods that are not internationally traded will also be recognized. The discussion will reveal that, as a consequence, such countries experience relative price effects when they devalue, along with the real money balance effect already explored.

¹Such recommendations are often highly unpopular politically, especially when they are perceived to be imposed by the International Monetary Fund (IMF). See Chapter 24 for more on the unpopularity of devaluations.

²Blind adherence to PPP (among other things) got the policy makers of the “southern cone” of Latin America (Argentina, Chile, and Uruguay) into trouble in the late 1970s. Vittorio Corbo and Jaime de Melo, “Liberalization with Stabilization in the Southern Cone of Latin America,” *World Development*, Special Issue, 13, no. 8 (August 1985): 893–916.

20.1 Nontraded Goods

We first introduced nontraded goods in Section 4.6. Chapter 19 explained that the existence of nontraded goods is one reason why PPP fails to hold in practice.

The primary examples of nontraded goods are not goods at all, but services. Some services, such as insurance, shipping, tourism, and computer programming, are internationally traded, and these have been growing in importance in recent years, especially with the advent of the Internet. (Witness the public attention to overseas outsourcing.) Nevertheless, most services are too localized to be traded internationally—for example, personal services like those offered by barbershops and dry cleaners. Some larger sectors, such as housing, utilities, and local transportation, also fit in this category.

Some goods are also nontraded, specifically those where the cost of transporting them internationally is prohibitively high. Highly perishable food is a good example. More commodities will qualify as nontraded in a country far removed from the rest of the world geographically, like Australia, than in one centrally located, like Germany. Prohibitively high trade barriers can also render goods nontraded. Particularly in developing countries, transportation costs and trade barriers sometimes insulate much of the economy from the rigors of international competition. In Latin America, for example, high import tariffs and quantitative restrictions on imports of manufactured goods historically have put into the nontraded category some industries that might otherwise be in the category of traded goods. A final case is that in which cultural tastes are such that foreigners are not interested in consuming the good in question. Who but an Australian could love Vegemite?

Output of Traded and Nontraded Goods

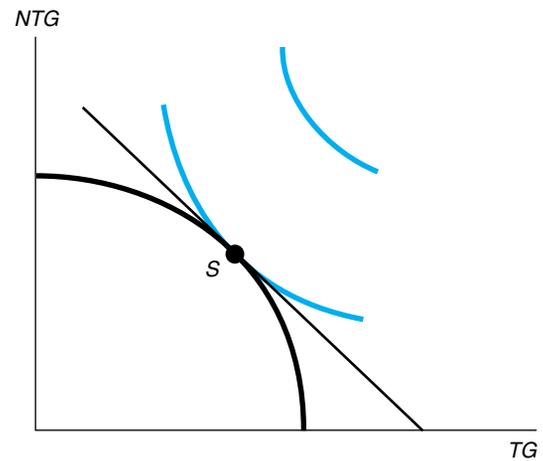
We now develop the appropriate model for thinking about a small open economy with nontraded goods.³ We recall that if the country is too small to affect its terms of trade, then we can aggregate together tradable goods, for the reasons explained in Section 19.4. We begin by drawing the production possibility curve, or transformation schedule, showing the different quantities of nontraded goods versus traded goods that the economy can produce if its labor and other resources are fully employed. Figure 20.1 shows this curve, with traded goods measured on the horizontal axis. The curve has the usual bowed-out shape, meaning that there are diminishing returns as more and more labor is shifted out of nontraded goods into traded goods. Section 4.6 considered the special case of Ricardian production, in which this production possibility curve was flat. In that case the relative price of traded goods in terms of nontraded goods is determined entirely by the relative labor costs of producing the two goods, which is a constant (the slope of the line). In general, however, the relative price will vary and with it the quantities of the two kinds of goods that are profitable to produce (as in Section 2.7).

Assume that the relative prices are given by the slope of the straight line in Figure 20.1. P_N will denote the relative price of nontraded goods. $P_N \equiv P_n / P_t$, where P_n

³A country's "openness" could be defined as the ratio of its production of traded goods to its total GDP. This chapter focuses on countries that, although small as in the model of Section 19.4, are not 100 percent open.

FIGURE 20.1
Output and Consumption of
Traded and Nontraded Goods

Production occurs where the transformation curve is tangent to a relative price line. Consumption occurs where the budget line is tangent to an indifference curve. As drawn, the two points coincide, so output of traded goods, TG , equals consumption of traded goods, and the same is true for nontraded goods, NTG .



and P_t represent the (nominal) prices of nontraded goods and traded goods, respectively. P_N gives the number of units of traded goods required to buy one unit of nontraded goods. When P_N is low, nontraded goods are relatively cheap and the budget line in Figure 20.1 is steep: A resident can buy a larger quantity of nontraded goods for any given quantity of traded goods.

In the most general case, many combinations of outputs are “fair game,” including points that lie inside the production possibility curve. These are points at which the supplies of labor and other resources are not being fully utilized, so that output of both goods is less than it could be. In this chapter, however, the discussion will be restricted to the assumption that labor and other resources are fully employed, as in Chapter 19. In this case, the quantities of output of the two goods, X_N and X_T , are given by the point S , where the line is tangent to the curve. The output quantities are the outcome of supply decisions that firms make when faced with the prevailing prices. Keep in mind that output of traded goods includes not only specific products that the home country might currently be exporting but also specific products that might be *imported* if the demand from domestic consumers exceeds domestic output.

Consumption of Traded and Nontraded Goods

The trade balance is given by the quantity of traded goods produced minus the quantity of traded goods consumed. If some of the output produced remains after domestic residents have bought what they want, it is exported and the country runs a trade surplus. There is no question as to whether there will be sufficient demand for the goods outside the home country because under the small-country assumption, the rest of the world will take all goods that the country has to offer at the going world price. If, however, domestic consumption of traded goods exceeds domestic output, then the difference is imported and the country runs a trade deficit. This way of thinking of the trade balance—as the difference between the output and the consumption of traded goods—is

the same as in the small-country model of Section 19.4, the only difference being that there *all* goods were traded goods. It is very different, however, from the way we thought of the trade balance in Chapters 16 to 18—as foreigners’ demand for the export goods of the home country minus domestic residents’ demand for the imports. In the present model, with all traded goods aggregated together, it is impossible to say what determines the level of exports and the level of imports. Fortunately, it is not necessary to know either level to determine the difference of the two, the trade balance.

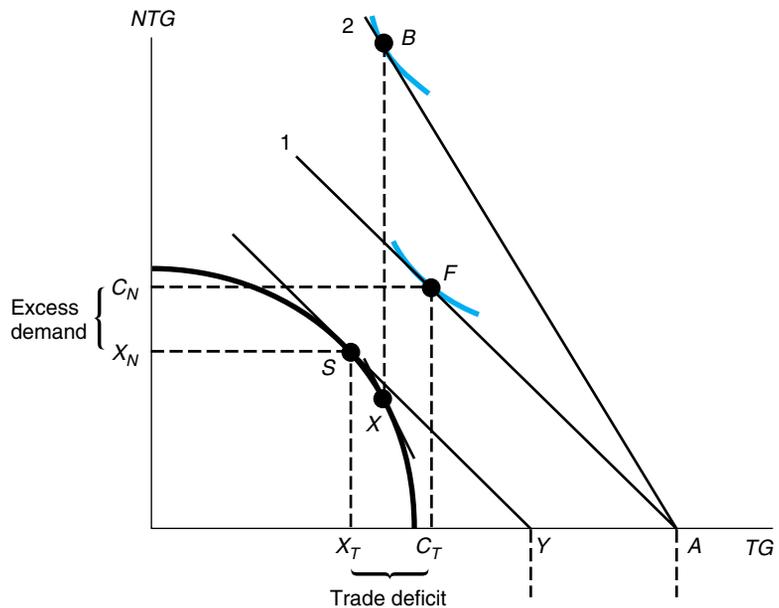
What determines the pattern of consumption? Assume, as in Figure 2.7, that we can draw community indifference curves. Along any given indifference curve, consumers are equally happy with the different possible combinations of nontraded and traded goods consumed, C_N and C_T . The slope of the indifference curve is the *marginal rate of substitution* between the two; it tells the amount of consumption of nontraded goods the consumer is willing to give up to get one more unit of traded goods. Indifference curves farther from the origin are better, of course, because more consumption is better than less. The curves are convex because of the diminishing marginal rate of substitution.

To attain the highest level of welfare available to them, consumers will determine their quantities purchased, C_N and C_T at the point on an indifference curve where the given price line is tangent, that is, where the marginal rate of substitution is set equal to the relative prices of the two kinds of goods. It is possible that this will be the same point, S , where production occurs. In that case the quantity of traded goods consumed will equal the quantity of traded goods produced. If this happens, the trade balance is zero. If we were to rule out gaps between expenditure and income, thereby ruling out trade deficits or surpluses, as in most of the first half of the text, we would necessarily be at S . Indeed, under this restriction, the relative price line would have to be determined endogenously by the unique point where the production possibility frontier was tangent to an indifference curve.

Now we allow for countries to “spend beyond their means.” We assume expenditure is at some level, A (measured in terms of traded goods: $A \equiv C_T + P_N C_N$), that is greater than the level of income, Y (also expressed in terms of traded goods: $Y \equiv X_T + P_N X_N$). For example, there may have been an income tax cut or an increase in expenditure on the part of the government that raised A . A and Y are measured along the horizontal axis in Figure 20.2. The budget line is the one that passes through point A , with consumers assumed to face the same relative prices as producers. (There are no taxes or subsidies on the goods.) C_N and C_T are located where the budget line is tangent to an indifference curve, at point F . This is where consumers attain the highest level of welfare, given their budget constraint. In Figure 20.2, consumption of both goods exceeds output. In the case of traded goods, the difference ($C_T - X_T$), which can be measured horizontally on the graph, is simply the trade deficit. Consumers are satisfying their excess demand for traded goods abroad. In the case of nontraded goods, the difference ($C_N - X_N$), which can be measured vertically, is the excess demand for nontraded goods. According to the definition of nontraded, this excess demand cannot be satisfied abroad but can be thought of as being satisfied out of inventories held by firms (temporarily, until they run out).

FIGURE 20.2**Increase in Expenditure,
Followed by Decrease
in Relative Price of
Nontraded Goods**

Assume expenditure exogenously increases to A , beyond income, Y . If relative prices are unchanged, consumption is at F , implying excess demand for NTG and excess demand for TG . If the relative price of traded goods is increased, it raises output of TG at X and may also lower consumption of TG at B .



Other conditions could exist in these markets as well: a trade surplus if F occurs anywhere to the left of S , and an excess supply of nontraded goods if F occurs anywhere below S . The next thing to consider is what determines these points of consumption and output.⁴

20.2 Expenditure and the Relative Price of Nontraded Goods

This section will examine the effects of changes in the level of relative prices P_N and expenditure A . Subsequent sections will show how exogenous changes in exchange rate policy and monetary policy bring about changes in relative prices and expenditure. For the moment, take P_N and A as given.

We examine the effect in the traded goods market first. Starting from a position of zero trade balance, S in Figure 20.2, an increase in expenditure with no change in relative prices will move the country into trade deficit because a certain share of the new expenditure falls on traded goods. Remember that importable and exportable goods are aggregated together. It does not matter here whether the additional purchases are

⁴Figure 20.2 is known as the Salter diagram because it originated with W. E. G. Salter, "Internal Balance and External Balance: The Role of Price and Expenditure Effects," *Economic Record* (August 1959): 226–238. Salter, like a number of the other authors who developed the model that features both traded and nontraded goods, was Australian. Australia fits the model relatively well because the two categories of goods are fairly clearly drawn. (The model goes by various names: Australian, nontraded goods, dependent economy, and small open economy.)

imports or goods that would otherwise have been exported; in either case the result is a worsening of the trade balance. When the new spending comes from the private sector—for example, in response to a tax cut—the deterioration in the trade balance is the marginal propensity to spend on traded goods times the increase in expenditure. When it is government expenditure that has increased, the import content could be either higher (as it usually is in the case of military weapons, construction equipment, or other capital goods) or lower (as in education or health services). For simplicity, assume that the government’s marginal propensity to spend on traded goods is generally the same as that of the private sector.

Maintaining Equilibrium in the Traded Goods Market

Let us now ask what would have to happen, after an increase in expenditure such as that illustrated in Figure 20.2, to restore trade balance, without claiming that this will in fact necessarily happen. To restore trade balance, the relative price of traded goods would have to rise to eliminate an excess demand for traded goods. This could happen if the country decides to devalue, that is, to increase the price of foreign currency. The price of traded goods will rise by the same percentage as the price of foreign currency. If the price of nontraded goods remains the same, or at least fails to rise as much as the price of traded goods, then the relative price of traded goods will have risen.⁵ In other words, the relative price of nontraded goods, P_N , will have fallen.⁶

It certainly sounds plausible that an increase in the relative price of traded goods will help eliminate an excess demand for traded goods, just as an increase in the relative price of chocolate will help eliminate an excess demand for chocolate. But we have to see how this would work. In Figure 20.2 the change means that the relative price line has become steeper (line 2 instead of line 1): Each unit of traded goods is now worth more units of nontraded goods. The effect on production of traded goods will clearly be favorable. As resources shift out of nontradables into tradables, we move down along the production possibility frontier from S .

What incentive induces resources to shift from one sector to the other? Within the tradable industry, the higher price at which firms can sell their products means that at S the real wage in terms of traded goods, W/P_T , is now below the marginal product of labor. These firms thus find it profitable to hire more workers. They will continue to hire workers until they reach the point at which the marginal product of labor is down to the level of the new real wage. In a full-employment model with flexible wages, the increased demand for labor from the tradables sector will quickly bid up the nominal wage—not just in that sector, but throughout the economy, assuming that workers are

⁵If the price of nontraded goods is fixed in terms of domestic currency because firms supply these goods with infinite elasticity—the same assumption that we made for domestically produced goods in Chapters 16 through 18—then a devaluation is the *only* way that the country can increase the relative price of traded goods. In this case, with nominal prices fixed, we could speak interchangeably of the nominal exchange rate and the relative price of traded goods.

⁶Incidentally, the relative price of traded goods in terms of nontraded goods in small open economies (particularly in Latin America) is sometimes called the *real exchange rate*. Because others use the term “real exchange rate” to denote the price of foreign goods in terms of domestic goods, we avoid this alternative use of the term.

basically the same in both sectors. Firms in the nontraded sector now find that the real wage in terms of *their* product has *risen*. They now find it less profitable to produce on the same scale as previously, so they release labor and contract in size. Under the full-employment assumption, the workers who lose their jobs in the nontraded sector are the same ones hired in the expanded traded sector. We continue to move down the curve until we reach X , the new point of tangency with the relative price line. By reading off the horizontal axis, we can see that the quantity of tradable goods has risen.

The effect of the increase in the relative price of tradables on consumption is not quite as clear as the effect on production. There is clearly a positive substitution effect: The steeper relative price line means a move upward along any given indifference curve to lower levels of consumption of traded goods. However, there is also an income effect that may go the other way. It depends on what is assumed about the level of expenditure. The experiment we are examining is an exogenous increase in expenditure and the associated change in relative prices that would be necessary if balanced trade is to be restored. In this experiment, when the relative price of traded goods rises, the expenditure line remains tied down at its new bottom endpoint (expenditure remains fixed at the new level, A , in terms of traded goods).⁷ The expenditure line swivels to its new, steeper slope, the same slope as the new price line facing producers. The new consumption point will be located at a point such as B , where the steeper expenditure line is tangent to a new indifference curve. This point could be located either to the right or left of the old point, F . Thus the consumption of traded goods could either rise or fall.

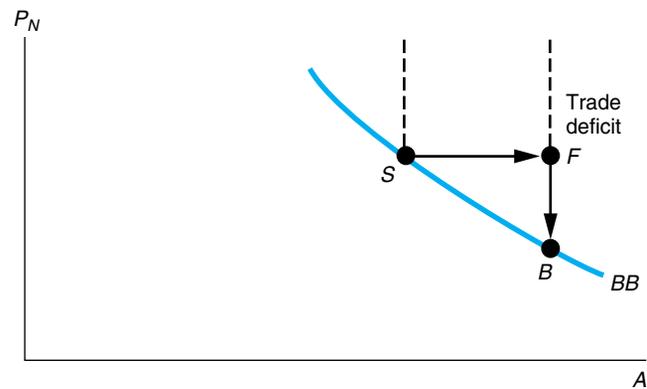
The trade balance is the difference between the production and consumption of traded goods. Thus, even if consumption fails to fall because of the income effect, the trade balance would still probably improve because of the unambiguously positive effect on production. Assume that the production effect and the substitution effect in consumption are large enough to outweigh the negative income effect in consumption; therefore, the net effect on the trade balance is positive. The new trade balance is the distance, measured horizontally, between X and B . If the increase in the relative price of traded goods is large enough, then it will eliminate completely the trade deficit that opened up when expenditure was increased. This is the case shown in Figure 20.2: B is directly over X .

Now consider, on a graph of its own, the relationship between expenditure, A , and the relative price of nontraded goods, P_N , necessary to maintain trade balance equilibrium. Figure 20.3 shows expenditure on the horizontal axis and the relative price of nontraded goods on the vertical axis. Again, S denotes the initial point of both external balance (a zero trade balance) and internal balance (no excess supply or demand for nontraded goods). Increased expenditure causes a horizontal move to the right (by precisely the same distance as the movement of the expenditure point along the horizontal axis in Figure 20.2). Point F lies in a region of trade deficit because expenditure on traded goods has increased, and a sufficiently large increase in the relative price of

⁷Because we are considering changes in relative prices, how we draw the graph depends in part on whether we define expenditure in terms of traded goods or in terms of nontraded goods. In other words, the precise question we are asking is slightly different, depending on whether we hold expenditure constant in terms of one type of good or the other. Naturally, then, the precise answer is slightly different.

FIGURE 20.3**Equilibrium in the Traded Goods Market**

In the aftermath of an increase in expenditure, A , if the relative price of nontraded goods, P_N , is decreased far enough, it will eliminate the excess demand for TG , which is the trade deficit. Thus equilibrium in the TG market gives the downward-sloping BB schedule.



traded goods would be needed to restore balanced trade. This is the same as a sufficiently large decrease in the relative price of nontraded goods, represented by a movement vertically downward from point F to point B in Figure 20.3. For each level of A , there is a corresponding level of P_N that is necessary to maintain balanced trade. We can trace out a whole series of points representing combinations of A and P_N , which is downward sloping, as shown in the graph. We label this curve BB , for balance of trade.

Maintaining Market Equilibrium for Nontraded Goods

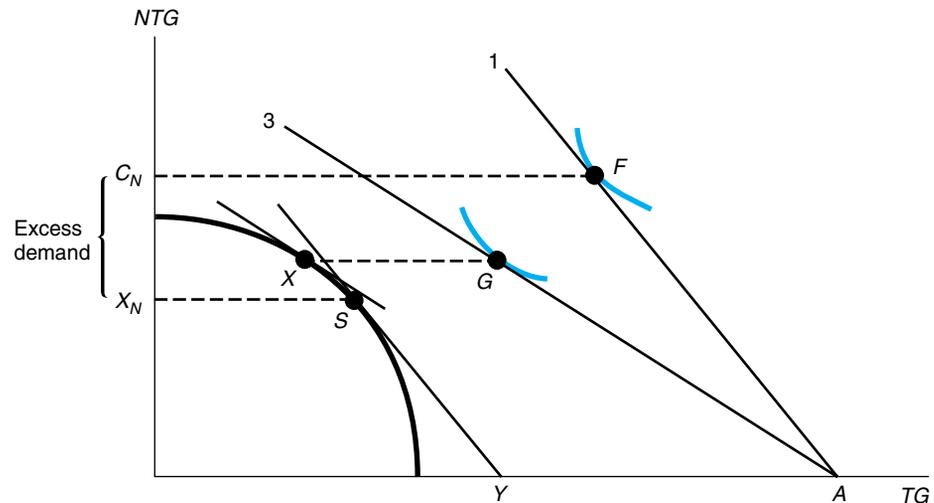
There is no reason why an increase in expenditure necessarily *will* be accompanied by a decrease in the relative price of nontraded goods to maintain equilibrium in the market for traded goods. This requires something like a deliberate decision by the government to devalue. Notice in Figure 20.2 that, although the excess demand for traded goods has been eliminated by the change in relative prices, there is now a large excess demand for *nontraded* goods: Point B lies far above point X . Policy makers may be just as concerned about equilibrium in the market for nontraded goods and the related problems of employment and inflation as they are about trade balance equilibrium. We now consider what would have to happen to maintain equilibrium in the market for nontraded goods instead of traded goods.

We return to the initial increase in expenditure that moves the economy to point F in Figure 20.2. Some of the increased expenditure falls on nontraded goods. Thus point F is a point of excess demand for nontraded goods. The excess demand can be measured vertically as the gap between consumption and output, in either Figure 20.2 or its equivalent Figure 20.4. In terms of Figure 20.3 or its equivalent Figure 20.5, the increase in expenditure causes the move rightward from S to F , into a region of excess demand.

Eliminating this excess demand for nontraded goods would require that the relative price of nontraded goods rise. Again there are effects on both production and consumption. The higher price of nontraded goods makes their production more profitable. Resources shift out of the other sector into nontraded goods, causing a move up along the production possibility frontier from S , as shown in Figure 20.4, until reaching a point of tangency, X , with the new, less steep relative price line. Thus X_N rises. The

FIGURE 20.4**Increase in Expenditure, Followed by Increase in Relative Price of Nontraded Goods**

Again, an exogenous increase in expenditure, A , beyond Y , moves consumption to F but leaves output at S if relative prices are unchanged. If the relative price of traded goods is decreased, it raises output of NTG at X and lowers consumption of NTG at G .



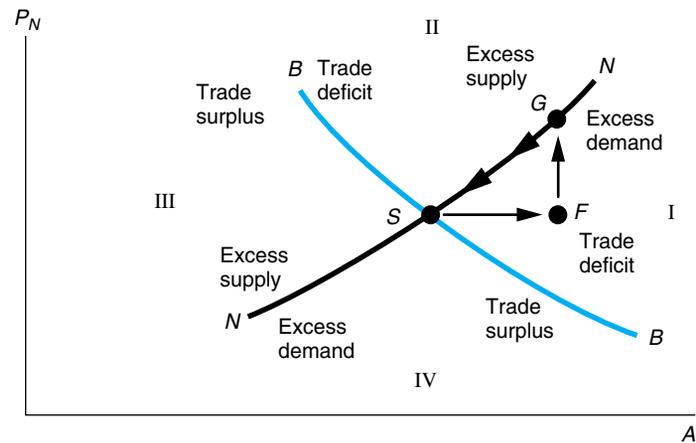
higher relative price of nontraded goods also means that consumers substitute away from them into the cheaper traded goods. The income effect, like the substitution effect, reduces consumption of nontraded goods, as is seen when the relative price line is rotated downward to the new tangency (line 3 instead of line 1). The income effect is not ambiguous, as it was when considering the demand for traded goods. C_N unambiguously falls at point G .⁸

If the increase in the relative price of nontraded goods is sufficiently large, then the upward movement of output and the downward movement of consumption will be sufficiently large that the point X and the point G will be at the same horizontal level: The excess demand for nontraded goods that opened up when expenditure increased will have been eliminated. In terms of Figure 20.5, a sufficiently large increase in the relative price of nontraded goods, P_N , returns the country to equilibrium in the domestic market at point G . There is an entire set of combinations of A and P_N , such as S and G , that give equilibrium in nontraded goods. These points constitute the upward-sloping internal balance schedule, NN . To recap the reason for the NN schedule's upward

⁸If expenditure had been set in terms of nontraded goods rather than in terms of traded goods, then a change in relative prices would have an ambiguous effect on the demand for nontraded goods and an unambiguous effect on the demand for traded goods. This is the method used in the dependent economy model in Rudiger Dornbusch, *Open Economy Macroeconomics*, 2nd ed. (New York: Basic Books, 1989).

FIGURE 20.5
Equilibrium in the Nontraded Goods Market

In the aftermath of the increase in expenditure, A , if the relative price of nontraded goods, P_N , is increased far enough, it will eliminate the excess demand for nontraded goods. Thus equilibrium in the NTG market gives the upward-sloping NN schedule.



slope, an increase in expenditure A must be accompanied by a sufficiently large increase in P_N if the potential excess demand for nontraded goods is to be eliminated.

The external balance schedule, BB , and the internal balance schedule, NN , together divide the policy instrument space into four quadrants, or four “zones of economic unhappiness.” (I) Any point such as F has a trade deficit and an excess demand for nontraded goods, as we have seen. Proceeding counterclockwise through the other three regions, we have (II) trade deficit with excess supply of goods, (III) trade surplus with excess supply, and (IV) trade surplus with excess demand. In general, the government would need to set both policy variables, A and P_N , to hit both targets. Only at point S are both the traded and nontraded goods markets in balance simultaneously. (The graph is conceptually the same as the Swan diagram derived in Chapter 18, although the curves are flipped vertically because that chapter showed increases in the exchange rate as movements up the vertical axis, rather than down.⁹)

To take an example, many Latin American countries in the period from 1974 to 1982 were at points like F , as the result of high levels of government spending: They experienced excess demand for nontraded goods together with large trade deficits, which they financed by borrowing from foreign banks.¹⁰ Many also had overvalued currencies, and thus were at points like G , even farther from external balance than F . After 1982, the typical Latin American country was obliged to cut the level of government

⁹More substantively, the Keynesian model focused on the price of exports in terms of imports, whereas this chapter uses the price of traded goods in terms of nontraded goods. Swan originally developed his diagram in the context of the nontraded goods model, not in the context of the Keynesian model. Trevor Swan, “Economic Control in a Dependent Economy,” *Economic Record* (November 1956): 239–256.

¹⁰The other major source of financing for government deficits in the Latin American countries was printing money. A point like G in Figure 20.5 is shown to correspond to a high rate of money growth and inflation, in Rudiger Dornbusch, “Stabilization Policy in Developing Countries: What Lessons Have We Learned?,” reprinted in his *Dollars, Debts and Deficits* (Cambridge, MA: MIT Press, 1986). It would follow that a prerequisite to eliminating inflation is eliminating the budget deficit (while simultaneously undergoing a real devaluation, if seeking to avoid excess supply of domestic goods in zone II, that is, seeking to move to S).

expenditure and devalue its currency to generate more foreign exchange earnings, thereby helping to pay the interest bill on the debts that it had incurred. It moved into region III of the diagram, with a trade surplus and an excess supply of nontraded goods. Developing countries in Latin America and some other parts of the world were obliged to increase their trade balances dramatically after 1982 in response to decreased availability of loans to finance their deficits. In the early 1990s, developing countries were able once again to finance large trade deficits. Chapter 24 discusses this phase and its subsequent reversal in the late 1990s.

20.3 The Monetary Approach with Nontraded Goods

Even if the government does not undertake any deliberate policy change in response to a trade deficit or in response to excess demand for nontraded goods at a point like F , two automatic mechanisms of adjustment may be set in motion. First, in response to the excess demand for nontraded goods, producers of these goods would be expected to raise their prices. If the market for nontraded goods operates with sufficient flexibility, the prices of nontraded goods, and therefore P_N , will rise sufficiently quickly to restore equilibrium at G .

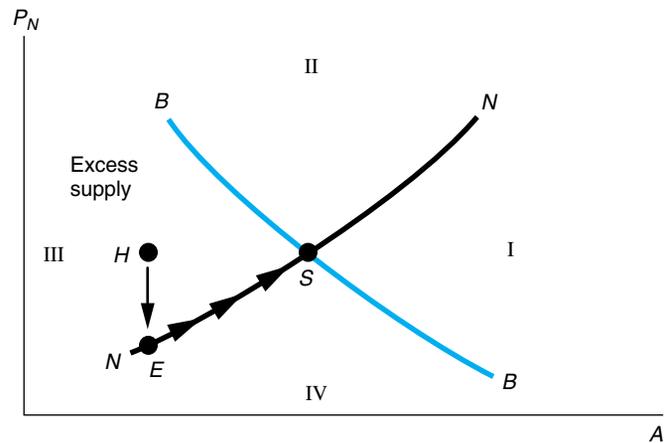
In practice this is likely to be a more gradual process. The adjustment process can be especially slow if the country finds itself in a position of excess supply, as at point H in Figure 20.6, because then a *fall* in the price of nontraded goods is required. There may be a prolonged recessionary period, with unemployed labor if wages adjust slowly. In such circumstances, a case can be made for speeding up the process by a change in government policy. One possibility is to devalue the currency, thus accomplishing the required reduction in the relative price of nontraded goods, and immediately jumping downward in Figure 20.6 to equilibrium on the NN schedule. Another possibility is to increase expenditure, moving to the right in the same figure. Unfortunately, a policy change bringing the country closer to internal balance may move it farther from external balance.

Reserve Flows

A second possible automatic mechanism of adjustment, which operates in response to external imbalances, is the flow of international reserves we studied in Chapter 19 under the monetary approach to the balance of payments. As we saw there, the money supply is one of the policy variables that determines the level of expenditure. When the country is running a balance-of-payments deficit, at a point like F in Figure 20.5, its level of reserves is decreasing over time. If the reserve loss translates into a reduction in the total money supply, then it will exert a contractionary effect on expenditure. A declining level of expenditure means a gradual movement leftward over time and a diminishing balance-of-payments deficit. The movement stops at a point on the external balance line, BB , because the rate of change of reserves is zero when the balance of payments is zero. However, if the monetary authorities offset the effect of the reserve loss on the money supply by expanding domestic credit (i.e., sterilize), then there will

FIGURE 20.6**Adjustment with Excess Supply of Nontraded Goods**

At a point to the left of BB , such as H , excess supply of nontraded goods puts downward pressure on the price of NTG . Even when the NN schedule is reached, however, there is still a trade surplus. If the reserve inflow is not sterilized, expenditure, A , increases over time.



be no leftward movement. However, the country cannot continue to intervene in the foreign exchange market forever. As the central bank's level of reserves approaches zero, the government will eventually be forced to react, either by reducing expenditure or—if it is too late for that—by devaluing the currency.

This is precisely what happened in the Mexican peso crisis of 1994. Sterilization of reserve outflows kept Mexico at a point like G for a while. But eventually the Banco de Mexico used up its reserves, and in December 1994 it was forced to undergo a painful devaluation and contraction of the real money supply, to return to S .

Similarly, when the country is running a balance-of-payments surplus, at a point like H in Figure 20.6, its level of reserves is increasing over time. If the upward effect on the money supply is not offset, then expenditure will be increasing. There is movement rightward in the graph, with the balance-of-payments surplus gradually decreasing over time, until equilibrium is reached somewhere on the BB schedule. Again, the government can forestall this process by reducing domestic credit (sterilizing), which it may choose to do if it is politically or emotionally attached to its trade surplus. Indeed, unlike the situation facing a deficit country, there is nothing to force a surplus country to adjust. For example, China has run enormous surpluses and allowed its reserves to pile up to levels that surpass the largest and wealthiest countries in the world.

The Dutch Disease

Reserve inflows can create serious problems, however. One cause of potentially undesirable reserve inflows is the Dutch disease, discussed in Section 5.8: a natural resource boom, as experienced by the Netherlands in the 1960s (a producer of natural gas) and a variety of other countries in the 1970s and again after 2002 (producers of oil, coffee, and various other mineral and agricultural products).

Sometimes the commodity boom takes the form of high export earnings because of high world prices today, perhaps prices that are only temporarily above their long-run equilibrium; in that case the surplus should appear in the current account. On other occasions, the commodity boom takes the form of newly discovered deposits that will

take time to develop; in that case the surplus should appear in the capital account, as the country borrows to smooth spending, and in particular to finance imports of capital goods necessary to develop the resource (e.g., equipment for drilling and pumping, in the case of oil). Either way, the commodity boom results in a surplus in the balance of payments.

Sometimes an analogy is drawn between the Dutch disease and other forms of exogenous inflows, such as unilateral transfers, or capital inflows arising from monetary stabilization or other sources. Many developing countries have experienced such inflows intermittently, particularly in three boom periods: 1975 to 1982, 1990 to 1996, and 2001 to 2006, as we shall see in Section 24.1. Whatever the cause of the reserve inflows, the difficulty arises when real appreciation of the currency causes a loss of competitiveness for exports of manufactured goods (or for any other tradable-goods industry)—excluding, of course, the industry experiencing the export boom that is the original source of the reserve inflow.

How does a reserve inflow lead to real appreciation of the currency? There are two possible mechanisms. On the one hand, if the monetary authorities keep the exchange rate fixed, then the monetary approach to the balance of payments indicates that the reserve inflow will cause the money supply to swell, which may in turn lead to increases in wages and the prices of nontraded goods. In this case the real appreciation takes the form of inflation. On the other hand, the monetary authorities may respond to the reserve inflow by allowing the currency to appreciate in *nominal* terms, bringing about the real appreciation directly. To take an example, the value of Colombia's currency tends to move with the international price of its leading export, coffee.

The real appreciation is an increase in the relative price of nontraded goods. In many countries experiencing a commodity boom, revenues accrue to the government, either because it owns the resource directly (the norm among oil exporters) or because it is paid royalties or tax proceeds by the private owners. Typically the government responds by raising spending, which is another source of increased demand and upward pressure on the prices of nontraded goods. Not only are resources pulled into the sector experiencing the commodity boom, but, less obviously, they are pulled into the production of nontraded goods such as construction. Resources are pulled out of the production of manufactures and other tradables—those that lie outside the booming commodity sector.

Even when events like the Dutch disease create difficulties for manufactured exports, this does not mean that the country as a whole is worse off. A country would be foolish to turn down a windfall gain on its commodity exports. After all, no country would welcome a *fall* in the value of an exportable resource. Examples of sudden falls in the price of a basic export commodity that lead to real depreciation and (often) sharp recession include Chile in 1974–1975 (copper), Bolivia in 1985 (tin), and Russia in 1998 (oil).

One of the main respects in which the Dutch disease can indeed be a “disease” is that the boom may turn out to be more temporary than the government had thought. When world prices go back down, the country can be left with an atrophied export sector, “white elephant” investment projects, bloated government payrolls, unwanted real estate construction, and sometimes even large international debts. The cycle of Dutch

disease followed by commodity bust, which can be attributed to the combination of volatile world commodity prices and poor institutions susceptible to procyclical government spending, often impairs long-run economic performance. It is one interpretation of what is called the “natural resource curse.” This is the observation that countries rich in natural resources can experience lower long-run economic growth than those without.

The Effects of an Increase in the Money Supply in the Nontraded Goods Model

We now formally examine, within the context of the nontraded goods model, the implications of the two assumptions associated with the monetary approach to the balance of payments: Goods prices are perfectly flexible, and reserve flows are not sterilized.¹¹ The first assumption means that the automatic mechanism of adjustment in the home (nontraded goods) market described earlier not only exists but operates instantly. Whenever the economy finds itself at a point of excess demand for nontraded goods, prices rise rapidly to clear the market, causing a jump vertically upward to the NN line. Whenever the economy finds itself at a point of excess supply of nontraded goods, prices fall rapidly to clear the market, causing a jump vertically downward to the NN line. In short, we assume that the economy is always on the NN line. The second assumption means that the other automatic mechanism of adjustment described earlier, via the balance of payments, is in effect as well. It will not operate instantly, however. As long as large-scale, rapidly responding capital flows continue to be ruled out, the rate of reserve flow is restricted to the same finite scale as the trade balance.

Consider first the effects of an increase in the money supply. Figure 20.5 showed how an increase in expenditure—whatever its causes—resulted in a move from point S to point F , featuring excess demand for nontraded goods and a trade deficit. A monetary expansion is precisely the sort of policy change that would cause such an increase in expenditure. Now that we are incorporating automatic adjustments in the market for nontraded goods, however, we recognize that point F represents an equilibrium that cannot last for long. Producers respond to the excess demand for nontraded goods by raising the nominal price. This is equivalent to raising the relative price, P_N , because the nominal price of traded goods is tied down (by the exogenous foreign currency price of traded goods and the fixed exchange rate). We move vertically upward from point F in Figure 20.5 until we reach point G on the NN line, where the excess demand has been eliminated. We assume that this adjustment takes place very rapidly, so that following the increase in the money supply, we virtually jump from point S to point G .

At point G the country is still running a trade deficit. In fact, the increase in the relative price of nontraded goods has moved the country even farther from trade balance equilibrium than it would be at point F (because the price change discourages the output of traded goods and encourages the consumption of traded goods). The balance-of-

¹¹The model that follows was developed by Rudiger Dornbusch, “Devaluation, Money and Nontraded Goods,” *American Economic Review* (December 1973): 875–880.

payments deficit means that reserves will be steadily flowing out of the country. Under the assumption that the reserve outflow is not sterilized, the money supply is declining over time. As the money supply declines, the level of expenditure, A , declines, so there is a move leftward in Figure 20.5. At the same time, however, P_N must decline, so as to eliminate any incipient excess supply of nontraded goods that would otherwise result from the declining expenditure and keep the country on the NN schedule. In other words, the movement is down and to the left, until eventually we return to balance-of-payments equilibrium at point S . Only when the rate of change of reserves, equal to the balance of payments, is zero will there be long-run equilibrium. In the long run the monetary expansion has changed absolutely nothing except the composition of the central bank's balance sheet: The original expansion in domestic credit has been offset by an equal decrease in the central bank's holdings of international reserves.

The Effects of a Devaluation

The primary motivation for introducing the monetary approach to the balance of payments in the presence of nontraded goods is to use it to study the effects of a devaluation. A devaluation should improve the balance of payments through two independent routes. First is the contractionary effect on expenditure introduced in Chapter 19 (the real balance effect). Second is the effect of the decrease in the relative price of nontraded goods, introduced in this chapter.

Consider an increase in the exchange rate. Under the assumption that the country takes the world price of traded goods as given, this causes a proportionate increase in the price of traded goods, P_T , expressed in domestic currency. The first effect of the devaluation occurs even if, for some reason, there is no change in the relative price of nontraded goods—that is, even if the prices of all goods rise by the same percentage. For example, assume that n stands for nuts instead of nontraded. What would happen if P_n , the price of nuts, along with P_T , the price of tin, rose by the same percentage as the devaluation? In Figure 20.6 this constraint would prevent any movement off a horizontal line through S . The economy moves from S to H . An increase in the price of traded goods reduces the real money supply. The reduction in real money supply (or, equivalently, the increase in nominal money demand) results in an excess demand for money. At H , households and firms cut back their spending to restore their level of real money balances.

In terms of Figure 20.1, the reduction in expenditure means that the budget line shifts inward, with an unchanged slope if relative prices remain unchanged. Thus the consumption point, the point of tangency with an indifference curve, occurs inside the production possibility frontier. Both consumption of traded goods, C_T , and consumption of nontraded goods, C_N , fall. Some of the decrease in spending takes the form of an “excess supply,” or surplus, of traded goods. This is the first favorable effect of the devaluation on the trade surplus. The rest of the decrease in spending, however, takes the form of an excess supply of nontraded goods. Inventories of nuts are piling up because demand is lower than producers of nuts anticipated. Only if nuts really were a traded good, so that the excess supply could be unloaded on the world market at the going price, would the relative price of nuts and tin be unchanged (*both* P_n and P_T having gone

up in proportion to the devaluation). Nuts are a nontraded good, however. To equilibrate the market for nontraded goods, their relative price, P_N , will have to fall. This means that the budget line in Figure 20.1 will become steeper.

Because we have already derived the NN schedule, it is easier to see the effects by turning back to Figure 20.6. The fall in the relative price of nontraded goods moves the economy from point H to point E on the NN schedule. That is, if nuts are nontraded, then their price does not rise by the same proportion as tin and other traded goods.¹² The decline in the relative price of nontraded goods yields the second favorable effect of a devaluation on the trade balance: As we saw earlier in the chapter, for any given level of expenditure, a lower relative price of nontraded goods means that more traded goods are produced and fewer consumed. The trade surplus is larger at point E , where both effects are operating, than at point H , where only the real balance effect was allowed to operate.¹³

The second aspect of the monetary approach now appears: the nonsterilization of reserve flows. At point E the country is running a trade surplus. If the money flowing into the country through the trade account is not offset elsewhere, then it will increase expenditure, which reduces the trade surplus. We move up steadily along the NN schedule: As expenditure rises, the price of nontraded goods must continuously rise to eliminate what would otherwise be an excess demand for nontraded goods. Money continues to flow into the country and expenditure continues to rise, until as always in the monetary approach, in the long run the country is back at S and the trade surplus has been completely eliminated.

This process illustrates some principles that recur throughout the study of devaluation. First, to have an effect on the trade balance, some variable must be “sticky” in the short run—in other words, it must be restricted from jumping discontinuously. A nominal devaluation reflected as equal increases in all nominal magnitudes would have no real effects. In Chapters 16 through 18, the sticky variable was the price of export goods; thus the devaluation changed the relative price of export and import goods. In the monetary approach to the balance of payments, the sticky variable is the stock of foreign reserves. Because the devaluation changes the real money supply, it has an effect on the trade balance in the short run, even in the absence of slow adjustment in the goods or labor markets.

Second, the sticky variable adjusts over time. When it is the stock of international reserves, it adjusts via the balance of payments. Analogously, when the sticky price variable is the price level, it adjusts via excess demand. In the long run, when all adjustments are complete, all nominal magnitudes have increased by the same percentage as the devaluation, which is to say that no real magnitudes have changed.

¹²The nominal price of nontraded goods, P_n , probably stays about the same in the short run, or rises a little (less than the nominal price of traded goods). It is even possible, in theory, that P_n falls. It depends on the elasticities of demand and supply of nontraded goods. All that is certain is that the *relative* price of nontraded goods, P_n/P_t , falls.

¹³To see the increase in the trade surplus graphically, think of successive waves of downward-sloping “iso-trade-surplus” lines emanating from the BB schedule in Figure 20.6, each one corresponding to a different level of the trade balance. Point E lies on an iso-trade-surplus line that is farther from BB than is H , so the trade surplus is larger as a result of the fall in P_N .

20.4 Summary

Most developing countries (and industrialized countries as well) have a substantial internal market where prices do not adjust instantly in response to a devaluation; in such countries the PPP model of Chapter 19 is not applicable. However, many such countries are too small in world markets to be able to set the price of their exports, so neither is the Keynesian model relevant. This chapter examined the effects of exchange rate and monetary policies in such small open countries with nontraded goods.

The trade balance can be thought of as the country's excess supply of internationally traded goods. We focused on two key variables: the level of expenditure and the relative price of nontraded goods (in terms of traded goods). One possibility is that these variables adjust automatically to ensure equilibrium in the two markets. Whenever there is a trade deficit, reserves flow out of the country; under the monetary approach to the balance of payments, the level of expenditure falls until trade balance equilibrium is restored. Whenever there is excess supply of nontraded goods, the price of nontraded goods falls until equilibrium in this market is restored as well.

In practice, these automatic mechanisms of adjustment are likely to work slowly at best. Thus there is an argument for the government to use its available policy tools to speed up the process. The government can adjust the level of expenditure by changing the money supply. The government can adjust the level of the relative price of nontraded goods by changing the exchange rate and thus changing the price of traded goods.

We saw that a devaluation works to improve the trade balance in a small country through two effects. In addition to the real balance effect studied in Chapter 19 (whereby the higher price level creates an excess demand for money and leads to a reduction in spending), there is a second effect. When the price of traded goods goes up in proportion to the devaluation, the relative price of nontraded goods goes down. In response, resources shift out of the production of nontraded goods into production of traded goods. Thus the trade balance improves by more than it would have if the price of nontraded goods had gone up by the same proportion as the price of traded goods. In the long run, however, all nominal magnitudes are likely to go up in proportion to the devaluation, leaving no permanent effect on the trade balance.

CHAPTER PROBLEMS

1. The country of Lampong used to import grain but now produces enough to feed itself. During the last few years imports have been essentially zero (as have exports). Does this mean that grain is a nontraded good?
2. You are the governor of the central bank in the country of Salesia, which is running a large balance-of-payments surplus as the result of recent discoveries of valuable natural resources. You are worried that the inflow of reserves through the balance-of-payments surplus is causing excessive growth in the money supply. Indeed, you have already exceeded the year's money supply target that you and the International Monetary Fund team agreed on at the time of their last visit. But you don't want to allow the currency to appreciate, causing your exporters in the manufacturing sector to lose competitiveness. What can you do?

3. You have just been called in to advise the government of Gondar. The country has been running a large trade deficit for years and is in trouble with its international creditors. Other economic statistics, however, are unreliable. More than the usual number of people seem to be wandering the capital looking for odd jobs. Also, prices for hotel rooms, pedicabs on the street, and the local delicacy in the countryside have all fallen since your last visit. In what quadrant of Figure 20.5 would you tentatively place the country's economy?
4. You are the finance minister of Khakistan. The country has started running a balance-of-payments deficit as the result of a bad harvest in the countryside, but the rest of the economy appears to be booming. Your foreign advisers suggest that you devalue your currency to eliminate the payments deficit. Do you agree with this course of action? If you are worried about inflationary pressures, how should you respond?
5. You are minister of trade in Santa Maria, which is undergoing an acute balance-of-payments crisis. In desperation you are considering cutting off imports of cotton, which is the country's main import because it is used by the large textile industry. Is this a good idea?
6. You are advising the prime minister of Phoenesia. Traded goods constitute half of workers' consumption basket. The other half consists of nontraded goods. The price of nontraded goods, P_n , is a simple proportionate markup to wages, W . Industry and the labor unions have agreed on a contract stipulating that two thirds of any increases in the CPI will be passed through to wages.
 - a. For every 1 percent nominal devaluation, what is the effect on the price of nontraded goods?
 - b. Assume that firms in the traded goods sector show an elasticity of supply (with respect to P_t/W) of 1.0. If the government wants to increase output of traded goods by 10 percent, how large an increase in P_t/W is required?
 - c. Putting together your answers to a and b, how large must the nominal devaluation be to bring about the desired increase in output of traded goods? How large is the resulting increase in the wage, W ? In the CPI?¹⁴

SUGGESTIONS FOR FURTHER READING

Corden, W. Max. *Economic Policy, Exchange Rates, and the International System* (Oxford, UK: Oxford University Press, 1994). Includes a verbal exposition of the dependent-economy model of the balance of payments.

Dornbusch, Rudiger. "Devaluation, Money and Non-traded Goods," *American Economic Review* (December 1973): 871–880. The classic model of the monetary approach to devaluation in small open economies. Nontraded goods are introduced in the second half of the paper.

¹⁴A simple version of the dependent-economy model along the lines of the calculations laid out in Problem 6 is sometimes known as the Scandinavian model. Nontraded goods are called the sheltered sector (sheltered from international competition), and traded goods, the exposed or competitive sector.