CHAPTER 3

Applications of the Basic Model

If Brazil has a bumper coffee crop, what happens to the world price of coffee? To real incomes in France? To welfare in Brazil? If oil supplies from the Middle East are restricted, how does the impact on Japan compare with that on the United States? If a country discovers new mineral deposits, how does this affect its current balance of trade? These are examples of questions that can be asked of the basic trade model outlined in the preceding chapter.

A strong result was obtained in Chapter 2's basic setting:

> *Any country that moves from autarky to free trade can experience gains in real income. Compensation schemes exist that guarantee all members of that country can gain from international trade.*

In considering various simple applications of the basic trade model, we start not from autarky but rather from a setting in which two countries already find themselves engaged in a free-trade equilibrium. Now the question of gains and losses becomes different, because once countries are engaged in trade they find themselves in an "open" position in that any disturbance in the terms of trade (i.e., world prices) either helps them or harms them, depending on whether the relative price of their exportables has risen or fallen. Furthermore, the applications we discuss all have a common theme: An initial disturbance or shock has a direct effect on a nation's welfare. But the terms of trade must adjust to clear markets, and this price change induces a change in real income as well. Do the direct and indirect effects reinforce each other or pull in opposite directions? Suppose the latter. For example, might a country that is unambiguously sustaining growth (an outward shift in its transformation schedule) nonetheless find its real income lowered because of the nature of its links with the global economy?

We start by briefly exploring a more simple question: What are the effects on the home country of demand and supply changes originating in the rest of the world? Then we consider changes that directly alter production and/or consumption at home or in both countries simultaneously. The chapter concludes with a wider set of assumptions and interpretations of the basic trade model studied in this and the preceding chapter.

3.1 Disturbances from Abroad and the Terms of Trade

There are several ways of illustrating a free-trade equilibrium. In Chapter 2, Figures 2.5 and 2.6 showed matching-sized trade triangles for the case of fixed production, and Figures 2.7 and 2.8 did the same when production responds to the move to free trade. An alternative, not shown here, would add up world demand for one of the commodities, say clothing, for each relative price of clothing and thus portray a world demand curve. In addition, for each such relative clothing price, the quantity of clothing produced in each country is determined, and these could be added together to yield an upward sloping world supply curve.[1] Here we illustrate a world free-trade equilibrium in a slightly different fashion. Assuming the home country will be the exporter of clothing in the trade equilibrium, we draw a rising *net* export supply curve for clothing for the home country (say curve X_1 in Figure 3.1) intersecting a downward-sloping import demand curve for clothing from the foreign country (curve M^* in Figure 3.1).[2]

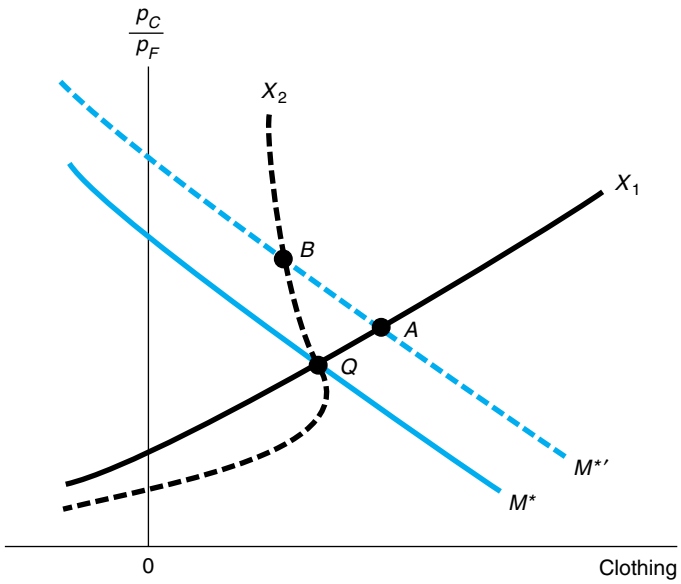
An Increase in Foreign Demand

From the initial equilibrium shown by point Q in Figure 3.1, suppose foreign tastes change so they demand more of our export commodity, clothing, at any relative price. This is shown by the shift of their demand curve to $M^{*\prime}$. The consequence: an increase

FIGURE 3.1

An Outward Shift in Foreign Demand

An outward shift in foreign demand for home exports of clothing raises clothing's price but may or may not increase home exports of clothing.



[1] In the special case shown in Figure 2.4(a), this supply curve would be a vertical line; and in Figure 2.4(b) it would be a "step" function such as we illustrate in Chapter 4.

[2] Autarky price ratios in each country correspond to positions along the vertical axis where the X_1 and M^* curves cut the axis.

in the relative price of our exports and, if our supply curve is X_1, a greater export quantity of clothing supplied to the foreign country, shown by point A.[3] Such an improvement in the home terms of trade raises real incomes at home. By how much? The relative improvement in home real incomes is proportional both to the relative improvement in the terms of trade and the fraction of the national income represented by the country's exports of that commodity. Formal details are provided in the supplement to this chapter.

Supply Shocks: Energy Prices

Changes in commodity supplies can dramatically affect world prices and incomes. The most severe fluctuations seem to characterize markets in natural resources. Few commodity markets have changed as much or have received as much attention as the markets in oil and natural gas. In the (so-called) first energy crisis, the rapid growth in world demand for energy in the late 1960s and early 1970s caused some tightening of oil prices even before the politically inspired decision of Arab oil producers to cut production and raise prices. The price rise was dramatic. For a complete decade (1960–1970) the posted price of Arabian light crude oil remained a constant $1.80 per barrel. (Actual prices differed a little from the posted price.) By October 1, 1973, this price had increased to $3.01, but a scarce three months later the posted price increased almost fourfold (to $11.65 per barrel). Although the nominal price of oil continued to rise in the succeeding four years, in real terms (i.e., relative to other prices) it fell slightly until the next round of sizable increases in 1979. By the mid-1990s oil prices were reaching low levels. At approximately $10 a barrel (nominal prices) concern was expressed that Russia and some other oil-exporting nations would be hard-pressed. By the end of the century, new heights of more than $35 a barrel had been reached, eclipsed, in nominal terms, by above $70-a-barrel prices by 2006. (In *real* terms the rise in price did not exceed earlier levels.)

Consider the terms-of-trade impact on real incomes of the first oil crisis in the early 1970s. U.S. imports of petroleum products rose from $7.6 billion in 1973 to a figure of $24.3 billion in 1974, the value more than tripling. Quantity figures remained roughly constant (imports of crude products were up slightly, refined products were down by approximately 10 percent); thus as a first approximation the rise in oil prices entailed a real income loss of roughly $16.7 billion (the increased cost of purchasing the same quantity of imports).

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[3]Also illustrated in Figure 3.1 is an alternative shape for the home supply curve, X_2, resulting in a new equilibrium in which the increase in foreign demand leads as before to a higher relative clothing price but now to a reduced export supply. The backward-bending supply curve for exports reveals that although more clothing may be produced at higher prices, the home country's real income improves as a consequence of these rising clothing prices, and some of these gains spill over to greater home demand for clothing. If such an increase in home demand exceeds the greater quantity produced, a *lower* quantity is available for export. Probably the example of a backward-bending supply curve most familiar from earlier courses is that of labor supply as the wage rate rises and, with it, the demand for leisure. In Appendix C to Chapter 2, this phenomenon of a reduction in export supply as the price of exports increases is shown in the BQR segment of the home country's *offer curve,* which is the segment in which home import demand becomes inelastic (i.e., less revenue required to purchase greater imports of food as food's relative price falls).

Changes in export prices also can severely affect a nation's terms of trade. For example, Sweden is almost completely dependent on imports of oil. On the export side, though, wood, pulp, and paper are important, and these products were rising in price at the same time oil prices were rising. Sweden's terms of trade in 1971 and 1972, before the first oil crisis, were not much different from those in 1975 and 1976. Indeed, in spite of the second round of oil price rises in 1979, Sweden's terms of trade improved by approximately 35 percent from 1978 to 1982.[4]

3.2 Protecting the Import-Competing Commodity

We turn now to situations in which the shock to a preexisting equilibrium comes not from abroad but from changes taking place at home. First we consider an example in which the shock is a policy change administered by the home country—an interference with market prices and resource allocation.

The doctrine of comparative advantage reveals the gains a country can obtain if it allows resources to be reallocated toward their best use given world prices. Thus in Figure 3.2 the country can do no better than to produce at A if world relative prices are shown by the slope of line 1, allowing consumption at point E. At point A prices reflect marginal costs, a hallmark of competitive behavior. Is there any rationale for the government to step in and to interfere with resource allocation—in particular, to protect the import-competing food sector?

Such interference in market outcomes could well be promoted by special interests. For example, suppliers of agricultural equipment would gain if food output is raised from A to B. Special-interest groups frequently do lobby the government to interfere in free markets in order to further their own ends. Such interference not only opposes the national interest but the lobbying effort also wastes resources that might otherwise have been used to produce commodities.

Putting aside these pressures, is there an argument for government interference for the *national* benefit? Perhaps. The key is the possibility that government action can alter prevailing world prices.

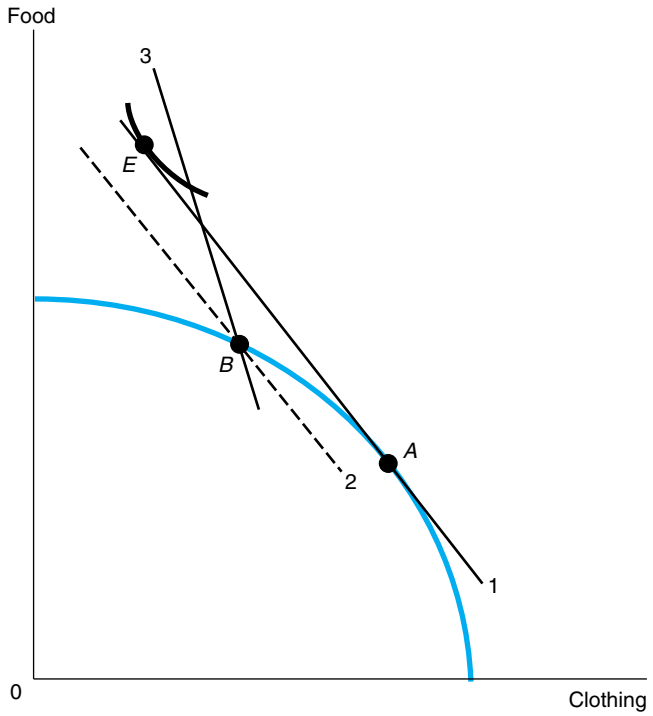
A policy of restricting food imports by tariffs or quotas encourages local production, say to point B in Figure 3.2. For a country too small to affect world prices, such resource reallocation makes no sense because it places the country on a lower budget line, line 2. But a large country restricting imports could cause the world price of food importables to be lowered. One possible consequence is an improvement in the terms

[4]See the United Nations, *Yearbook of International Trade Statistics,* 1980, 1981 (New York: United Nations); and International Monetary Fund, *International Financial Statistics,* 36 (10) (October 1983). For an example of more violent ups and downs in the terms of trade, consider the case of Zambia. When oil prices rose from 1973 to 1974, the unit value of imports (price index) rose 30 percent, but the rise in world copper prices increased the unit value of exports by 20 percent. The following year (1975), import prices continued to rise, but copper prices crashed. With 1973 as a base year of 100, Zambia's terms of trade only deteriorated to 92 in 1974 but fell to 47 one year later. (These figures are computed from the International Monetary Fund, *International Financial Statistics.*)

FIGURE 3.2

Restriction on Exportables Production

If free-trade world prices are indicated by the slopes of lines 1 and 2, the home country might benefit by lowering clothing output from *A* to *B*, if such a policy could raise world clothing prices to those indicated by line 3.



of trade such that the original consumption bundle (*E* in Figure 3.2) is dominated by some consumption points on the new budget line at world prices, that is, line 3.

This argument provides possible rationalizations for commercial policy that we explore in greater depth in Part III. Here our point is that a particular policy that creates losses at *initial* terms of trade may nonetheless prove to be welfare enhancing once the required terms-of-trade adjustments are taken into account. That is, the secondary price changes may have more of a welfare impact than the primary shock that caused the price changes. This reasoning should be familiar from your earlier studies of monopoly or monopsony behavior: Lowering quantities bought or sold can raise profits by causing prices to change.

Although Figure 3.2 illustrates a case suggesting possible gains from protection of the import-competing sector, several warnings should be posted. First, we have left unexplored just what the policy of protection does to *domestic* prices. For example, producers are content to move resources to point *B* only if the domestic price of food is raised to match the slope of the transformation schedule at *B*. But this distorts consumption choices as well, preventing the best point along line 3 from being chosen. Second, we have not explicitly investigated the world market for food, which reveals how much prices change when food production is protected, leading to an inward shift in the net home demand for imports of food. Finally, foreign countries may retaliate with restrictions of their own when the home country protects its food producers. Part III continues and extends the story.

3.3 Growth and International Trade

Does a country necessarily gain by producing more? The wary reader may wonder about the quality of life as it is affected by the extra production. Is growth beneficial if it leads to increased congestion, pollution, and crime in urban areas? In a different vein, is aggregate growth desirable if it reflects a population explosion that threatens to lower per capita income? These arguments against growth are both popular and easily understood, but there is a less obvious question: Can an outward shift of the production-possibility schedule in a country with a constant population—with food and clothing "goods" instead of "bads"—ever lead to a lowering of real incomes at home? If a country is engaged in foreign trade, the answer is perhaps.

The preceding discussion of the manner in which changing the composition of output can alter the terms of trade and real income serves as the key to the possibility that these terms-of-trade changes might even outweigh the directly beneficial effect of growth. Consider Brazil, heavily committed to an export crop, coffee, for which world demand is highly inelastic. Suppose it is a good season, or that for some other reason Brazil's transformation schedule shifts outward, primarily in the direction of coffee production. The world price of coffee might fall so much that Brazil loses real income as a consequence of the good crop. The argument also is valid for groups within a country. Agriculture provides the prime example. On behalf of their farmers, many nations attempt to encourage crop-restriction programs—the opposite of growth—to keep farm prices from falling in the face of inelasticity in demand.

We start our discussion by considering the case of *balanced* growth: Suppose the country's transformation curve expands outward by a uniform 20 percent and, as well, its demand for both food and clothing expand by 20 percent at initial world prices. What is the impact on world markets? The country's demand for imports has risen, and its supply of exports has expanded as well since its trade triangle has been enlarged (at initial prices). The result: *The sheer act of growing more than other countries induces a deterioration in the terms of trade that to some extent may erode the gains from growth.* But note the bright side: The country's growth causes real incomes to rise in other countries that are importers of the growing country's exports.

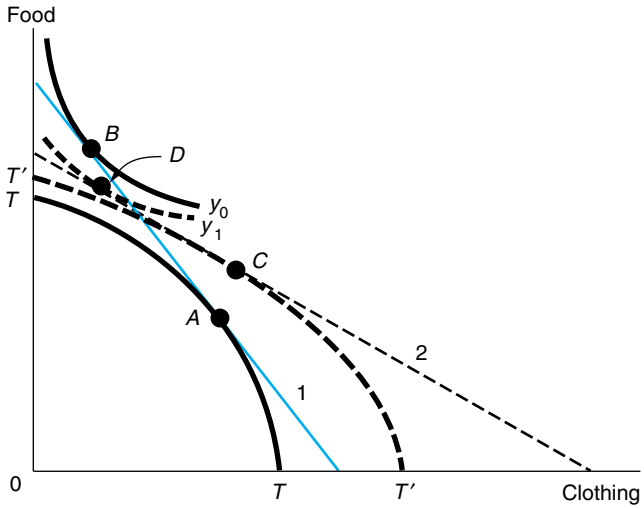
Turn now to a more paradoxical-sounding case, the extreme possibility that growth could *lower* real incomes by being concentrated in a nation's export sector and by significantly worsening the country's terms of trade. This is known as a case of *immiserizing growth* and is illustrated in Figure 3.3. Initially, the terms of trade are given by the slope of line 1, with the home country's production at A and consumption at B. Growth in some form that favors the nation's export industry, clothing, shifts the transformation schedule outward from TT to $T'T'$. As a consequence, it is assumed the relative price of clothing in world markets drops to the level shown by the slope of line 2. The home country adjusts its production to point C and, at the new terms of trade, maximizes its real income by consuming at point D. However, its real income after growth, as indicated by the y_1 indifference curve, is lower than the original real income shown by indifference curve y_0. Economic growth has hurt the country.

Two basic factors contribute to this result: (1) Growth primarily increases capacity and output in a nation's export industries, and (2) Demand elasticities throughout the world for the country's export commodity are quite low. The first factor ensures that

FIGURE 3.3

Immiserizing Growth

Growth biased toward the nation's export industry (clothing) can reduce real income by so worsening the terms of trade (from line 1 to line 2) that consumption (at *D*) ends up on a lower indifference curve than initially (at *B*).



the major effect of growth in world markets is the increased supply of the nation's exports, whereas the second suggests that the terms of trade must deteriorate sharply to raise world demand for these exports enough to clear commodity markets.

The importance of the secondary effects of changes in the terms of trade is not limited to this case of immiserizing growth. If demand elasticities are low, outward shifts in the supply of a nation's exportable tend to worsen its terms of trade and thus serve at least to dampen any gains even if real incomes improve. In many countries farmers look askance at bumper crops that face inelastic demands.

International trade forges strong links among national real income levels. Suppose your country is growing *less* rapidly than others. Your country's terms of trade are apt to improve if net world supplies of your imports are thereby increased. Growth anywhere in the world benefits the trading community as a whole, but whether all participants share in the gains depends not only on the initial allocation of growth among nations, but also on trading patterns and the succeeding adjustments in world prices.

3.4 The Transfer Problem

Terms-of-trade changes serve to *transfer* real income between importing and exporting nations. Historically, more direct forms of transfer have been important as well, leading economists to analyze the resulting welfare consequences for open economies, once the secondary transfers, represented by price changes, are considered together with the initial direct transfer.

The Transfer Problem: Purchasing Power

Consider the following cases: The home country is obligated to make a gift or reparations payment to the foreign country. The home country could be France after the Franco-Prussian War in 1870–1871 or Germany after World War I. To broaden the

possible categories, consider a different kind of gift, the Marshall Plan, whereby the United States sent aid to Europe after World War II. For analytic purposes international lending and borrowing will also be included, but the future problems of repaying loans (a reverse transfer) will be ignored. More recent examples emerge from conflicts in the Middle East: The rise in oil prices following the OPEC actions in the early 1970s or late 1990s involved a "recycling" of surpluses earned by oil-exporting countries into loans to Western Europe. And following the Gulf War in 1991, Japan, Germany, Kuwait, and Saudi Arabia made Desert Storm payments to the United States. In 1998 the International Monetary Fund arranged large transfers to countries in the Far East whose economies were severely affected by the financial crashes in 1997. All these cases have something in common: One or more countries transfer purchasing power to another.

The easiest way to prepare the basic trade model to handle this problem is to let the home country, assumed to be the transferor, cut the aggregate value of its spending below the current value of its produced income by precisely the same amount as the foreign country expands its spending above its current aggregate production level. (Only in this way can world expenditure balance world production.) This amount is called the *transfer*.

How does such a transfer affect the terms of trade? To answer this question, ask what the transfer does to world demand and supply for one of the traded commodities (e.g., food). A transfer only of purchasing power would leave the world supply schedule in place but might cause the world demand curve to shift. At any given price ratio, the home, or transferring, country can be expected to cut back its spending on all normal commodities such as food. Abroad, the receipts of the transfer are disbursed in general over all commodities, including food. Therefore, the home demand curve for food shifts leftward while the foreign curve shifts rightward; depending on the difference in the two countries' taste patterns, the world demand curve could shift in or out.

The first conclusion, then, is that transfer can move the terms of trade in either direction. To probe more formally, let m and m^* denote home and foreign *marginal propensities to import*. These propensities indicate, for each country, the fraction of a unit of extra total spending that would be allocated to the consumption of importables at initial prices. Thus, if T denotes the transfer, the home country, at initial prices, cuts its spending on food by mT. The foreign country imports clothing, so it allocates $(1 - m^*)$ times the transfer to extra food consumption. Thus the world demand curve for food shifts to the right if, and only if, $(1 - m^*)T$ exceeds the home cut, mT. That is, the terms of trade turn against the transferor (the relative price of food rises when the home country makes a transfer) if and only if the sum of the two countries' marginal propensities to import falls short of unity.

If the sum of the marginal propensities to import does fall short of unity, economists speak of the *secondary burden* of the transfer to acknowledge the fact that price changes create an international redistribution of income *additional* to the initial loan or grant. Between the two world wars, a number of eminent economists were concerned with the practical importance of this issue. John Maynard Keynes eloquently argued that the reparations payments imposed by the Allies on Germany after World War I

underestimated the true payment that Germany would have to make.[5] According to Keynes, Germany's export prices would have to fall considerably, coupled perhaps with a rise in its import prices, in order for it to create the export surplus that would comprise the counterpart of the financial transfer. In reply to Keynes, Bertil Ohlin proposed that the transfer itself, by lowering spending in Germany and raising spending in the recipient country, could bring about the required export surplus without imposing a change in the terms of trade. Ohlin's reasoning is closer to the analysis here, which suggests that it is not necessary for the terms of trade to change one way or the other.[6] In any event, tracing the adjustments that the German reparations required is difficult, for this period was characterized by an additional reverse transfer in the form of private loans and capital movements from the United States to Europe.

Is It Better to Give or to Receive?

The transfer criterion tells us that the terms of trade move in favor of the country making the transfer if the sum of import propensities exceeds unity. How favorable can the terms of trade become? The discussion of the possibility of immiserizing growth in Section 3.3 makes clear the analogous possibility that the home country, by giving away purchasing power, might so improve its terms of trade that it ends up with improved welfare. This, however, cannot happen in this two-country setting, for "it is never better to give than to receive." Figure 3.4 helps explain the limits of any "secondary blessing" of the transfer.

The initial world equilibrium in the food market is shown by a relative price of food, $0A$, and quantities produced and consumed, $0F$. (Instead of illustrating equilibrium in the world food market by the balance between net import demand at home and net export supply abroad, we show total world demand and total world supply.) If the home country makes a transfer, its real income is reduced. Conversely, if its terms of trade improve (the price of food falls), this loss will not be so severe. Let price $0B$ represent exactly the improvement in the terms of trade (compared with $0A$) required fully to compensate the home country for the transfer. That is, if the price of food should fall to level $0B$, neither country's welfare would be altered from its pretransfer level. The question boils down to the following: Can the transfer shift world demand to the left sufficiently to reduce food's price to $0B$ or lower? No. After the transfer, if the price *were* $0B$, world demand for food would have to exceed its initial value, $0F$. The reason follows from looking at income and substitution effects. By assumption, net real income in both countries is unchanged if the price of food falls to $0B$; therefore, there is no income effect.[7] Substitution effects refer to changes in demand that would take

[5]John Maynard Keynes, *The Economic Consequences of the Peace* (New York: Harcourt, Brace and Howe, 1920).

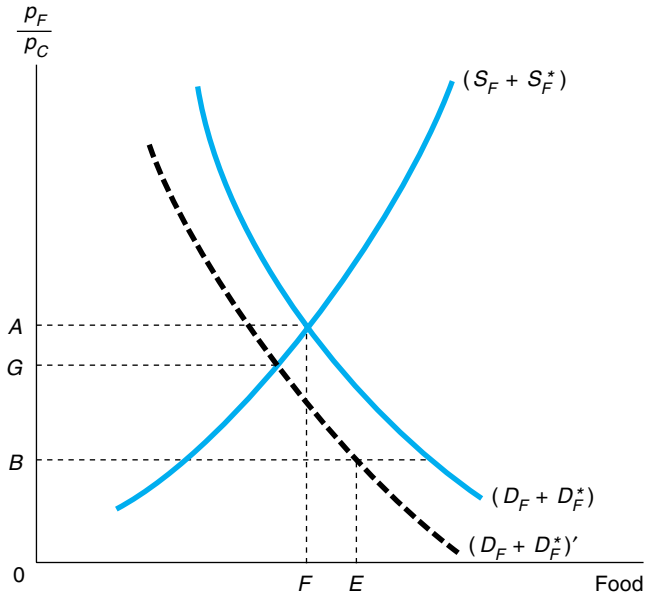
[6]See the exchange between Keynes and Ohlin: Keynes, "The German Transfer Problem," *Economic Journal,* 39 (March 1929): 1–7, and B. Ohlin, "The Reparation Problem: A Discussion," *Economic Journal,* 39 (June 1929): 172–173. Both are reprinted in American Economic Association, *Readings in the Theory of International Trade.* A discussion of the effect of a transfer on the balance of payments appears in Chapter 17.

[7]Price $0B$ is the price that leaves the home transferor's real income unaltered, by assumption. But the transfer itself cannot create or destroy real income in the world, so at $0B$ foreign real income also is undisturbed. Warning: This conclusion needs some modification if more than two distinct countries are engaged in trade.

FIGURE 3.4

Transfer and the Terms of Trade

A transfer may improve the terms of trade of the transferor, as shown by the drop in food's relative price from 0*A* to 0*G* when the home country (the importer of food) makes a transfer. 0*B* represents such an improvement in the home country's terms of trade that real income would be unaffected by the payment. Therefore, at price 0*B*, world demand must exceed world supply because only substitution effects are involved in demand.



place along initial indifference curves. Because at price 0*B* real incomes are unchanged in both countries, food's lower relative price must call forth a substitution of food for clothing in demand patterns for both countries. Therefore, even if the transfer shifts the world demand schedule to the left, it must be to some position such as $(D_F + D_F^*)'$, with a new relative price for food 0*G* above 0*B*.

Brazil might improve its position by burning part of a bumper coffee crop. It cannot improve its position by giving that coffee away. Growth (or the reverse) shifts the world supply curve; a transfer of purchasing power does not. Without a change in supply, price changes in this two-country world do not outweigh the direct effect of the transfer.

The Transfer Problem: Real Resources

A transfer in the form of a gift, a loan, or reparations often involves more than a redistribution of purchasing power. Real resources may be moved from one country to another. This movement may be direct, as in the stripping of German capital equipment at the end of World War II and its relocation in Eastern Europe and the old Soviet Union. The process may also be indirect: Canada, for example, may borrow funds in the New York market, causing a greater investment in new capital equipment in Canada and perhaps less new capital equipment in the United States.

A transfer of real resources may alter net world supplies at any given price. A scenario that reveals it *might* be possible for a country to gain by giving away resources can easily be suggested: Suppose that each country produces a different commodity, so if the home country transfers resources abroad, supplies of its own export good are cut

and supplies of its import commodity are expanded. The result: Its terms of trade tend to improve, perhaps enough to make such a transfer justifiable even if no payment is made for it.

3.5 Wider Interpretations of the Basic Trade Model

The basic trade model is simple—a stripped-down version in which only two countries are engaged in trade, producing only two commodities, with the value of each country's imports exactly balanced each period by the value of its exports. The real world of international trade is much richer than this, and yet the key to understanding its complexities is indeed provided by the simple basic model. Here are some of the wider interpretations.

Many Final Traded Commodities

Trade usually takes places in a large set of completely different commodities, some of which may be good substitutes for each other in demand or production, and others not. Furthermore, such broad aggregates as food and clothing may really mask a variety of goods differing in characteristics to demanders but produced in similar fashion. Thus a country might export some varieties of clothing and import others. This kind of *intra-industry* trade is examined in Chapter 7.

The basic point is that trade allows the item-by-item balance between a nation's consumption and production, which holds in autarky, to be replaced by only an overall balance in the value of all exports on the one hand and all imports on the other. Furthermore, with many commodities produced and traded, it is easier to see that a nation may export a much reduced set of commodities than it imports. That is, international trade allows each country to concentrate its production to a small subset of goods in which it has the greatest comparative advantage and to rely on other countries for a wider set of the remaining traded goods. Such an asymmetry suggests even greater gains from international trade.

Many Countries

If the world consists of many countries, what happens to the requirement that the value of a nation's exports be equal to the value of its imports? Is this condition applicable to each pair of countries? No. Overall balance certainly does not imply bilateral balances. The United States can run a trade deficit with China and Japan along with trade surpluses with Australia, Latin America, and/or the European Union. What sense is then to be found, say, with requiring the United States to have balanced trade with China? In a free-trade world, it is normal to find bilateral surpluses or deficits between any pair of countries. It is only *overall* balance that counts, yet again allowing asymmetries that lead to even greater gains from trade.

In a two-country world, trade patterns are mirror images of each other. A many-country world is different. One country might expands its exports, causing a drop in the

price of such exports, but all other countries do not thereby gain because some other countries may well be exporting the same commodity and thus lose.

Trade in Intermediate Goods and International Factor Mobility

Countries such as Japan and Canada often are portrayed as opposites in their trading patterns. Japan is starved for oil, coal, rubber, and many raw materials required for its manufacturing sector, whereas Canada possesses an abundance of many primary products and energy, which it can trade for automobiles, television sets, and computers. The sheer volume of world trade in nonconsumer goods is impressive—over three quarters of the world's exports are categorized as producer goods, raw materials, or intermediate goods, and this fraction is increasing as the world's production facilities become ever more integrated. Lower transport costs and technical advances that serve to reduce the costs of services that link various fragments of previously integrated production processes lead to *outsourcing* these fragments among several locations where costs of production are lower. As well, productive factors such as labor, capital, and management services may, to some extent, be capable of moving from country to country. Multinational enterprises often facilitate such factor mobility. Furthermore, any nation may find its level of technological knowledge enhanced by its trading contacts with other nations. (Chapters 8 and 9 pick up these themes.)

Nontradable Final Commodities

Just as some inputs and producer goods may be traded on world markets, some final consumer goods may have their markets restricted nationally or locally. High transport costs account for some of these, but currently governmental regulations are frequently more responsible. Obviously the use of the simple two-commodity basic trade model does not allow much scope for such nontradable final consumer goods. As Chapter 4 reveals, the two-commodity model can still portray the situation for a small open economy that is a price-taker for all traded goods and produces and consumes a nontradable. The secret lies in the strategy of aggregating all the tradable goods into a single composite commodity, with spending shares on individual traded goods serving as weights in a price index.

Intertemporal Trade

Not only might a nation not have a bilateral balance with any other particular country, it might not have an overall balance in any particular year. Such a situation does not necessarily reflect a crisis in desperate need of repair. Instead, it is quite normal for some countries to borrow and others to lend. The analogy: A young person may plan to spend now in excess of current earnings and to make it up later when earnings are expected to rise. In similar fashion, the aggregate of individual decisions within a country may call for a deficit or surplus in current spending plans, with borrowing or lending in world markets allowing intertemporal smoothing of consumption and production plans. Goods today and goods tomorrow are different. Comparative advantage, taste

patterns, and productive potential can vary over time, just as they do over commodity types, and can suggest optimal patterns of net trade over time as well as net trade in autos or computers.

Consider a simple example. Suppose a nation, initially balanced in exporting a variety of commodities that matched in value its current imports, discovers new deposits of natural gas that will take time to develop. In future years it can confidently expect outputs to rise significantly over current levels. Assuming it does not expect prices to be much affected by these discoveries, how might its trading pattern be affected? Its current discounted level of wealth has increased because of expectations of greater production in the future. It probably would be best to spread the benefits of this wealth over time, and such consumption smoothing would entail running current deficits (an excess of imports over exports), to be made up later when production expands by planned trade surpluses (an excess of future exports over imports).

Such intertemporal trade requires using assets with internationally recognized value, just as exchanges of commodities within any time period are aided by using money to avoid the transaction costs required by barter. More is said later about such assets and the problems encountered when using different currencies because one obvious problem with intertemporal trade is the possibility of changes over time in the exchange rates that link currency values in various countries. The emphasis here is on a different set of prices: interest rates. Countries that tend to discount future consumption relatively heavily may be encouraged by the opportunity to borrow on world markets at interest rates that seem low by their national standards. The world pattern of interest rates, and of commodity prices, reflects the diversity among countries in tastes and production plans. Just as it is not necessary for a country's trade in any commodity category or with any group of countries to balance, so it is not necessary to balance overall payments within any given time period. This merely reflects the gains from trade over all commodities, present and future, when world markets supplement or replace the requirement for item-by-item balance found in autarky.

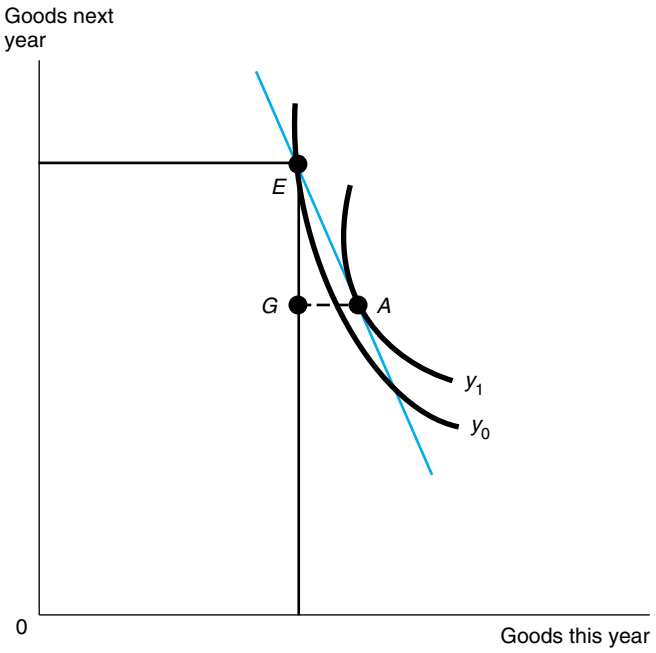
A simple illustration of intertemporal trade is provided in Figure 3.5. Suppose point E is the production point, reflecting a brighter future in which next year more of a composite good will be produced than is the case this year. Furthermore, suppose world interest rates are shown by the slope of line EA. More particularly, the slope of this line is $(1 + r)$, where r is the rate of interest. The trade triangle is EGA, where the country runs a deficit (excess of consumption this year over production this year) of GA, paid for by a promise to pay back EG next year. EG exceeds GA. (The ratio of EG to GA is 1 plus the interest rate, so that trade is balanced intertemporally.) The slope of the home indifference curve at E reflects the higher rate of time preference in autarky for the home country. As this example illustrates, intertemporal trade yields standard gains from trade if autarky prices differ from those on world markets.

A country such as the United States may run a current account deficit, as it has in recent years, but this may not necessarily represent a disequilibrium position in dire need of policy correctives. Although views regarding the urgency of the need to combat such deficits vary widely, the argument sketched here is that this deficit represents an imbalance in one time period that can be offset by opposite imbalances in the future. Intertemporal trade can yield gains to all participants.

FIGURE 3.5

Intertemporal Trade

The home country expects a larger endowment of goods next year than it has this year. It gains by giving up more next year (*EG*) than it borrows for extra consumption this year (*GA*).



Trade in Assets

The portfolios held by individuals and firms in one country often contain assets representing claims on other countries. The reasons such diversification takes place are not hard to find and reflect the fact that countries differ from each other in various ways: the kinds of business firms that issue securities, the attitude of governments toward activities in the private sector, resource endowments, and climatic conditions. International trade itself encourages countries to concentrate productive activities according to comparative advantage, and trade in financial assets makes it possible for residents in one country to avoid the greater degree of risk such production concentration entails by obtaining income streams based on productive performance in other countries. Thus, even if a country has a balance between current exports and imports and does not, *on net*, engage in intertemporal trade, it may be exchanging assets with other countries.

Any changes in interest rates, exchange rates, or commodity prices could well lead to a reshuffling of these asset holdings as well as to introduce real gains or losses. For example, in 1994 Japanese investors took big losses when they sold off American real estate, hotels, and resorts (primarily in Hawaii and California) they had purchased at top prices a few years earlier before the U.S. recession and when the yen was weaker. In 1997 and 1998 much asset reshuffling took place as a consequence of severe turmoil in Asian financial markets. (More on this in Part V.)

The fundamental principle of trade underlying all these remarks is that international trade frees up the lockstep connection between patterns of consumption and

production that characterizes a state of autarky. In general, severing the umbilical cord connecting local demand and supply allows a wider choice for consumers and encourages a concentration of resources in production. This is a fundamental lesson imparted by the basic model. In the next set of chapters we analyze in more depth the details of how technology, relative factor endowments, scale economies, and the possibility of trade in nonfinal commodities shape trading patterns and the distribution of income.

3.6 Trade and Market Structure

Discussions about international trade and the sources of gains from trade have traditionally assumed that commodity and factor markets are characterized by perfect competition: Both firms and consumers take market prices as given in making decisions about purchases and sales. Such an assumption implies that indifference curves are tangent to budget lines (which we assume throughout) and that, with marginal costs equal to prices, budget lines are also tangent to production possibilities curves. Such an assumption is usually rendered more realistic in a context of international trade because a greater degree of competition exists than would prevail in autarky. However, pure competition is not ubiquitous, and we have occasion in later chapters to pursue the consequences of departures from the competitive paradigm, especially in Chapter 7.

3.7 Summary

Part I of this book was devoted to developing what we call the basic trade model. Chapter 3 shows how that model can be applied to the following issues that characterize the world trading community:

1. Any disturbance abroad that causes world markets to settle at new prices affects the home country. A change in foreign tastes or in foreign supplies involves a terms-of-trade impact for the home country, which may be sizable, as our discussion of the oil crisis suggests.

2. A country with a volume of trade sufficient to influence world prices can, by interfering with its competitive production pattern, engineer an improvement in its terms of trade. This observation proves significant in understanding noncompetitive behavior in trade and its relevance to the analysis of commercial policy.

3. A growing community finds that repercussions of its growth are reflected in its terms of trade. We argued that in a two-country world, the benefits of growth in one country would spill over favorably to affect the other country by cheapening the growing country's exports. We even considered extreme cases in which growth might leave a country in a worse position. Agriculture supplies many examples in which crop restriction (the opposite of growth) might benefit farmers.

4. Some disturbances may affect both countries in opposite directions. The transfer process, wherein a gift or loan is made between countries, provides the classic

example. If only purchasing power is transferred, the crucial consideration involves how tastes differ between payer and receiver. Any required price adjustment involves a secondary transfer of real income. If productive resources are transferred, further price adjustments may be necessary.

5. The basic trade model is broadly applicable to settings in which many countries produce and exchange a wide range of goods and services. The requirements of overall balance do not necessarily imply a bilateral balance between any pair of countries. Furthermore, countries may exchange assets with each other and may take advantage of trading contacts to rearrange aggregate consumption and production over time. International net borrowing and lending may represent an equilibrium outcome by which interest rates help balance national dissimilarities in time preference and expected changes in resources and wealth.

   "Every exit is an entrance to another stage." This survey of the basic trade model prepares the way for a more detailed investigation in Part II of what lies behind a nation's production possibilities. Although Part II focuses on different issues such as the effect of trade on the distribution of income and the influence of technology and factor endowments on the pattern of trade, the models developed there represent more detailed variations of the basic model discussed in Part I. Can expansion in an open economy's supply of capital bring about actual harm? Once we know how such growth affects the nation's output pattern, the material discussed in this chapter will help expose the elements that determine the fate of the nation's real income.

CHAPTER PROBLEMS

1. Figure 3.3 illustrates the phenomenon of immiserizing growth when the country's growth is strongly biased toward its export industry (clothing). Construct a diagram that illustrates the possibility that a country may suffer a welfare loss when growth (at initial terms of trade) results in a balanced (proportional) increase in food and clothing outputs. Can such immiserization accompany growth that is concentrated in food (the import-competing sector)?
2. If imports of food represent 20 percent of a country's national income and the relative price of food rises by 10 percent, by approximately how much is real national income reduced?
3. Suppose that home and foreign countries' taste patterns differ but that each is inflexible: The home country consumes food to clothing in proportions 2:1 (at any prices); the foreign food to clothing consumption ratio is always 1:1. The two countries have identical bowed-out transformation schedules. What happens to the home country's terms of trade if it makes a consumption loan to the foreign country? Is there a secondary burden of the loan?
4. Draw a diagram to illustrate the case of uniform growth—the transformation schedule shifts out radially from the origin by 30 percent. How might such growth affect the country's terms of trade? Now suppose a country receives as a transfer a quantity of

resources from its trading partner. Suppose also that this has the effect of causing its transformation schedule to shift outward by 10 percent and the giving country's schedule to shift uniformly inward by 10 percent. Would the giving country suffer a secondary burden or blessing? How is the growth case related to the transfer exercise?

5. Suppose that only two countries engage in trade and that initially trade is balanced in the current period. If the home country discovers a new process that will raise productivity in its export sector in the next period, how would the current balance of trade be affected? Would your answer be modified if both countries also expect that the discovery will worsen the home country's terms of trade during the following period? (*Hint:* Could the foreign country's real net wealth be increased by more than the home country's as a consequence of the expected terms-of-trade change?)

SUGGESTIONS FOR FURTHER READING

Bhagwati, Jagdish. "Immiserizing Growth: A Geometrical Note," *Review of Economic Studies,* 25(3) (June 1958): 201–205. A treatment of the possibility that growth can harm a country.

Jones, Ronald W. "The Transfer Problem Revisited," *Economica* (May 1970): 178–184. A simple analysis of the transfer problem making use of the box diagram analysis in Appendix A of Chapter 2.

APPENDIX

The Stability Issue

Chapter 3 illustrated world market equilibrium in Figures 3.1 and 3.4. Each of these figures shows a unique stable equilibrium in which stability is guaranteed by two features: (1) Supply and demand curves are drawn so that at prices above equilibrium world supply exceeds world demand while at prices below equilibrium world demand exceeds world supply. (2) It is assumed that price is driven up if, and only if, excess world market demand exists.

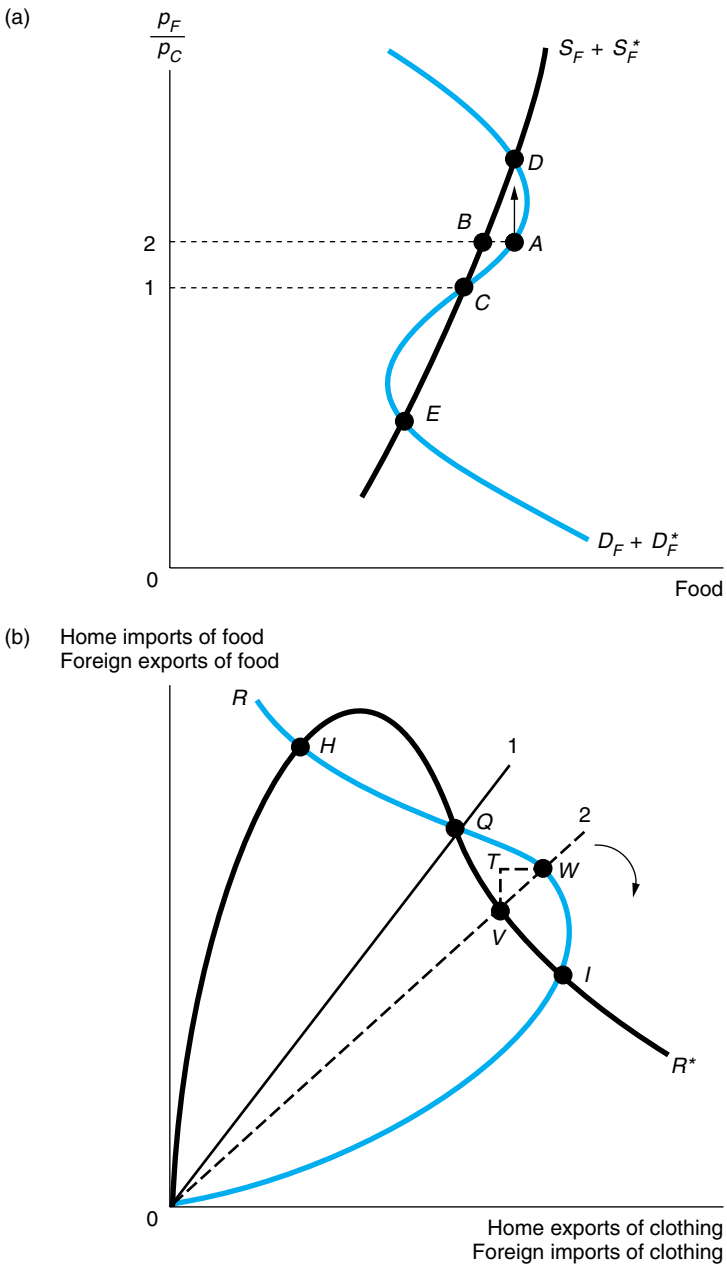
Competitive markets that are not so well behaved can be illustrated. For example, the counterpart to Figure 3.1's illustration of a stable free-trade equilibrium is Figure 3.A.1's depiction of *multiple* free-trade equilibria. Point *C* in Figure 3.A.1(a) shows world demand and supply for food in balance, but the equilibrium point is unstable. If the price of food were slightly higher, at 2, world demand for food would exceed world supply by distance *AB*. Such an excess demand would drive food's price upward, away from point *C*. (Similarly, for a price of food lower than 1, world excess supply would drive food's price lower, toward stable equilibrium point *E*.)

Figure 3.A.1(b) illustrates this instability in an offer curve diagram. At disequilibrium terms of trade 2, *TV* indicates the excess of the home country's import demand

FIGURE 3.A.1

Multiple Equilibria

There may be multiple free-trade equilibria. The middle equilibrium point [*C* in (a) or *Q* in (b)] is unstable but is flanked by a pair of stable equilibria.



for food (given by point *W* along home offer curve 0*IWQHR*) over foreign export supplies (given by point *V* along foreign offer curve 0*HQVIR**). Food's relative price will rise, rotating price line 2 clockwise toward stable intersection point *I* and away from unstable point *Q*. Point *Q* in 3.A.1(b) corresponds to point *C* in 3.A.1(a).

Each diagram helps reveal the ingredients that conspire to make an equilibrium unstable. As point *Q* in panel (b) indicates, instability requires a high degree of inelasticity in both countries' offer curves.[8] Panel (a) shows that for instability the aggregate world demand curve in the neighborhood of equilibrium must be positively sloped and even flatter than the world supply curve.

Can the world demand curve be positively sloped? Yes, if at least one country's demand curve has a positive slope in the neighborhood of a free-trade equilibrium. Consider first the importer of food, the home country. As food's price rises from (1), substitution effects suggest less food is demanded. Furthermore, real income falls; therefore, assuming that food is a normal commodity, both income and substitution effects conspire to reduce the home country's demand for food. Thus instability must stem from the demand behavior of the exporter. For foreign exporters of food, income and substitution effects run counter to each other. As the price of food rises, so does foreign real income, and this tends to make the foreign demand curve for food positively sloped. In order for the *world's* demand curve to be positively sloped, the exporter's income effect must outweigh the income effect of the importer, as well as both countries' substitution effects. In order for the market to be unstable, the exporter's income effect must in addition outweigh any positive production response of food producers at home and abroad.

Nothing automatically guarantees market stability in the relationship between income and substitution effects. Therefore, an additional assumption that the market is stable must be made. Little interest attaches to equilibria that are unstable because prices tend to run away from such equilibria. The applications of the basic trade model considered in Chapter 3 involve comparing one equilibrium with another, under the assumption that prices do approach the second equilibrium after the market is disturbed (by growth, taste changes, or transfers). Such a procedure makes sense only if the market is assumed stable. The supplement to Chapter 3 probes more deeply into the analytics of this issue.

[8]As the supplement to Chapter 3 proves, the criterion for stability is that the sum of the two countries' elasticities of demand for imports exceeds unity, the so-called *Marshall-Lerner condition.*