PART I

Comparative Advantage and the Basic Model of International Trade

CHAPTER 2

The Gains from Trade

Some trade patterns need little explanation. If you live in the United States and like coffee, you have your coffee imported from Brazil or some other coffee-growing country because it is not produced at home. If you live in Germany or Italy, you depend on foreign sources to supply fuel and lubricants for your sports car. If such imports were to be cut off, your level of well-being or "real income" would surely be reduced. If all trade were of this kind—with every country producing commodities desired by all countries but available only locally—there would be little need for the economist either to expound on the virtues of trade or to explain trade patterns. These would be almost self-evident. Billions of dollars in world trade are spent each year on coffee, chromium, copper, tea, oil, sugar, and other items that nature has placed in some areas but not in others.

Many items that are exchanged on world markets, however, could be produced in a number of locations. Cost comparisons dictate that some countries produce and export computers or steel or textiles to other countries that find it advantageous to concentrate on agricultural or mineral products. Countries differ from each other in their technologies, climates, and skill levels, as well as in their relative supplies of primary factors such as land and labor; these differences all bear upon production costs and trade patterns. Some productive activities require a large scale of output to bring costs down, so these occur in relatively large countries. Historical experience has conditioned labor forces in different countries to acquire different skills, thus imparting an advantage in the production of particular commodities and not in others.

How best to acquire an understanding of these various sources of gains from trade? Our strategy throughout this book is to start with the simple before moving to the complex. Therefore, in order to describe the fundamental forces that determine trade, this opening part of the book is ruthless in its simplifications. We consider a model in which two countries engage in trade and in which each country is capable of producing only two kinds of commodities (food and clothing).[1] Labor and any other inputs in the production process are assumed to be trapped within national boundaries, and international trade provides each country the opportunity to consume food and clothing in proportions different from those produced locally. If the basis for mutual

[1]These commodities do not sound as exotic as computer chips and potato chips or airplanes and widgets, but they have been chosen partly because their broad, bland nature is meant to be purely representational of what in the real world is a myriad of different, highly differentiated commodities that enter world trade.

gains from trade can be established in such a simple, stripped-down setting, there is even more reason to expect flourishing trade in a world of many countries and many commodities.

There is a result that is absolutely basic in the comparison of a country's well-being if it were cut off from all international trade with the country's real income if it is allowed to trade. In a setting of only two countries (as in this chapter). the result can be stated as follows:

> *If relative commodity prices differ between countries in the absence of trade, both countries can gain by exchanging commodities at any intermediate price ratio, with each country exporting the commodity that is relatively inexpensive in that country before trade.*

Such a powerful proposition requires a closer study of background behavior in the standard determinants of market prices, namely, demand and supply.

2.1 Background Behavior: Demand

We begin our discussion of demand by considering a single individual and then by making a heroic assumption that a country's demand behavior can be represented in similar fashion.

The Budget Constraint and Relative Prices

The concept of *relative* price arises naturally in this simplified two-commodity trading world. Clothing's relative price is the amount of food that must be surrendered in a market exchange for one unit of clothing. You are more used to prices being quoted in money terms—dollars in the United States, euros in France, and yen in Japan. If you know money prices, you can compute relative prices; if clothing costs $5 a yard and food $10 a bushel, the relative price of clothing is one half, measured in bushels (of food) per yard (of clothing). If food and clothing are traded on world markets, their relative price is known as the *terms of trade*.

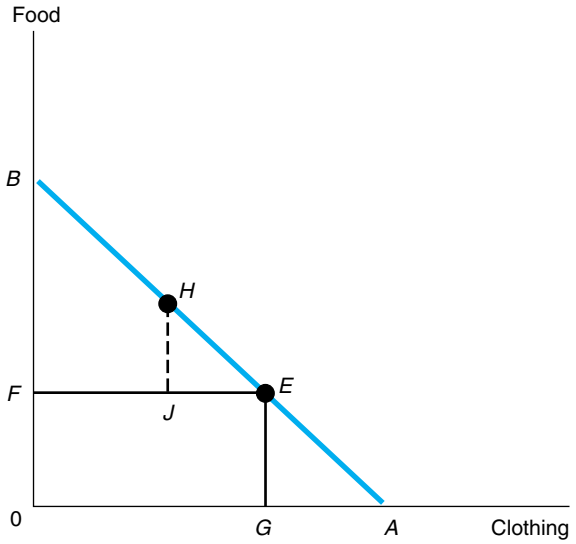
The reason we wish to concentrate on relative prices instead of absolute (currency) prices is that we are making an extremely simple assumption about the link between expenditures and incomes represented by production (or ownership) of clothing and food: Individuals (and, therefore, nations as well) spend exactly the value of their incomes. In reality, an individual often manages a close balance between current spending and current income, with discrepancies met by net cash outflows or inflows or by changes in other assets and/or liabilities. Here we assume an exact balance.

Such an assumption, which we refer to as the *classical form of the budget constraint*, greatly eases our task in the first half of this book because it allows us to postpone issues dealing with exchange rate crises, the international monetary system, and a nation's balance-of-payments adjustment problems. Does this mean we are assuming a barter economy? No. Instead, we take for granted the advantages that a monetary system conveys in easing transactions. We require only that any market purchase of food

FIGURE 2.1

The Budget Constraint

The slope of the budget line *BEA* is *HJ*/*JE*. It shows the relative price of clothing. Its inverse, *JE*/*HJ*, is the relative price of food.



be matched exactly by a sale of clothing of equivalent value. Because of this restriction on spending behavior, it becomes important to pierce the monetary veil of currency prices to know how much clothing must be exchanged per unit of food or how much food must be surrendered to purchase one clothing unit.

Figure 2.1 illustrates the consumption choices available to an individual who possesses a fixed endowment bundle E ($0G$ units of clothing and $0F$ units of food) but who is allowed to trade food for clothing (or vice versa) at some specified market prices. Given these prices, the individual can compute all the combinations of food and clothing that have the same value as does endowment point, E. These combinations are shown in Figure 2.1 by a downward-sloping line through E, the *budget constraint line* BEA. For example, suppose the individual wishes to consume the commodity bundle shown by point H on this line. Let food and clothing prices be denoted by p_F and p_C, respectively. If H is to have the same value as endowment point E, the value of net purchases of food (p_F times amount HJ) must equal the value of clothing given up in exchange (p_C times amount JE). That is, clothing's relative price, p_C/p_F, is shown by the absolute value of the slope of the budget line, which is HJ/JE.

The slope of the budget line indicates how much of one commodity must be given up to obtain one unit of the other. If commodity prices change but the individual's endowment point (E in Figure 2.1) does not, the budget line changes slope but still must pass through the endowment point. Suppose that food's relative price increases. Would this be shown by rotating budget line BEA around point E in a clockwise or counterclockwise direction? This is a simple question, but experience reveals that it is well worth thinking through. A higher relative food price than is shown by line BEA in Figure 2.1 would be shown by a flatter line through E—more clothing would have to be given up in exchange for one unit of food.

The budget line through the endowment point shows only what food and clothing bundles *could* be purchased; it does not specify which point *would* be demanded. To determine consumption choices, we must have information about taste patterns or preferences, as well as about endowments and relative prices.

Preferences: Indifference Curves

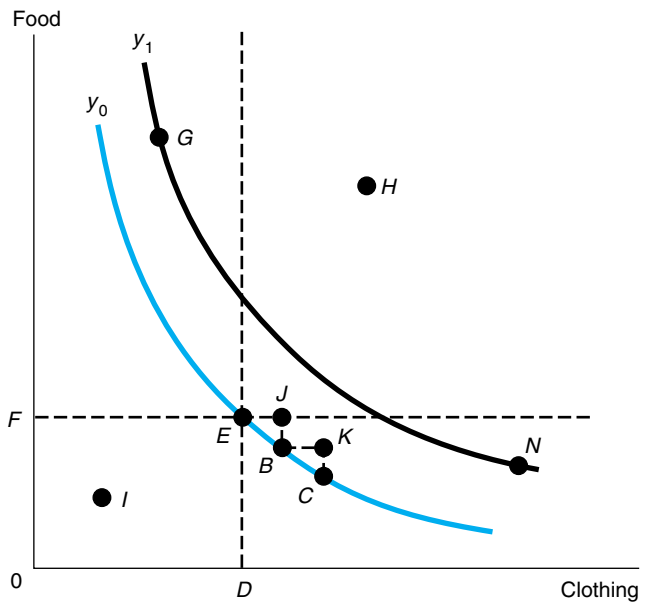
Indifference curves, expressing our individual preferences or tastes concerning food and clothing, are illustrated in Figure 2.2. Start by considering the bundle of food and clothing shown by point E (quantity $0D$ of clothing and $0F$ of food). How do possible consumption points I and H compare with E? This is easy. H is preferred to E, and I, having less of both food and clothing, is inferior to E. The challenge is to ask how bundles with more of one commodity and less of the other compare with E. To take this step by step, suppose one unit of clothing is added to the consumption basket at E. This leads to the higher level of satisfaction that would be obtained from bundle J. Then ask how much food must be taken away from the individual so that welfare is restored exactly to what it was at E. Suppose this quantity is JB. If so, the individual is indifferent to the choice of consuming bundle E or bundle B. E and B lie on the same indifference curve, labeled y_0 in Figure 2.2. (Throughout the book the symbol y indicates real income, utility, or satisfaction.)

The preceding remarks establish that indifference curves are negatively sloped: A sacrifice in the quantity of one commodity consumed must be balanced by an appropriate increment in the quantity of the other commodity. The indifference curves in Figure 2.2 also are *bowed in* toward the origin, reflecting the common assumption

FIGURE 2.2

Indifference Curves

The bowed-in shape reflects diminishing marginal rates of substitution. All points on indifference curve y_1 are preferred to any point on indifference curve y_0.



that the marginal rate at which individuals are willing to substitute more of one commodity for less of another changes along an indifference curve. In particular, the amount of food the individual is willing to sacrifice to obtain another unit of clothing diminishes as more clothing is consumed. (Ratio KC/BK is smaller than ratio JB/EJ). The *marginal rate of substitution* is indicated by the (absolute value of the) slope of the indifference curve. It diminishes along the curve y_0 as more clothing is substituted for food.

The indifference curve y_0 is one of many that could be drawn. Indeed, the "commodity space" is filled with these curves. Another is curve y_1, which is farther out from the origin and therefore indicates a higher level of real income than does curve y_0. For example, point G is preferred to point E. If the individual initially possessed the bundle of food and clothing indicated by point E and then was able to exchange some clothing for food to allow consumption at point G, the individual's well-being would clearly be improved. If, instead, the possibility of exchanging food for clothing were available at a substantially lower relative price for clothing, the individual might be able to consume at point N, by giving up some food for clothing, again representing a consumption bundle superior to endowment point E. As we illustrate later, it is precisely this kind of gain that can be achieved by international trade.

2.2 Background Behavior: Supply

The preceding account of how an individual's demand for commodities depends on relative prices assumes that the individual possesses a given endowment bundle of food and clothing. Consider now a more general accounting for a country as a whole. At any given time certain technological knowledge of how to transform inputs of labor, land, and various kinds of capital into commodities (food and clothing) is possessed by producers in this economy. Furthermore, the resource base available for production is assumed to be given and known. Together, technology and the resource base determine the maximal amounts of food and clothing that could be produced in the country. The locus of these quantities is called the *production-possibilities schedule* or the *transformation curve*.

The Transformation Curve

The transformation curve shows the maximum amount of one commodity that can be produced, given the quantities of all other commodities produced. A general illustration of such a schedule is the TT' curve in Figure 2.3, which depicts a simple economy capable of producing only two commodities, food and clothing. For example, if clothing output is distance $0G$, the maximum amount of food that can be produced is AG.

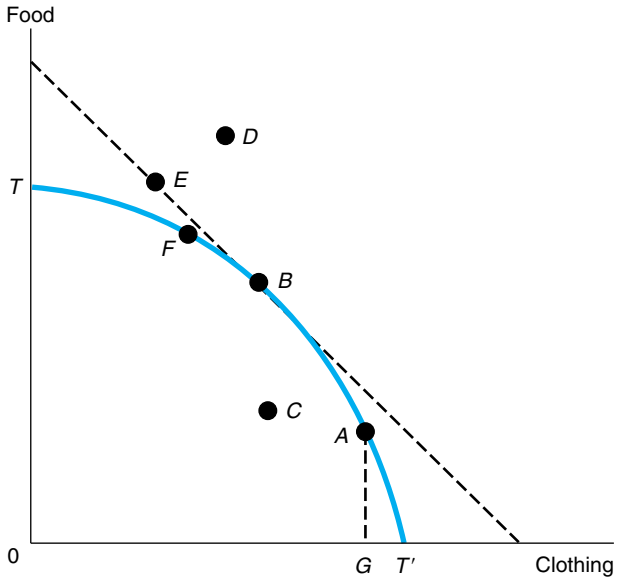
Several properties of production are illustrated by curve TT':

(i) Some points of production (e.g., D) are beyond the productive capacity of this community. If the resource base expands with time, or if better production techniques are developed, then point D eventually could be produced.

FIGURE 2.3

The Production-Possibilities Schedule

The bowed-out curve *TT′* shows the maximum amount of food that can be produced for each amount of clothing, subject to the constraints of technological knowledge and a fixed resource base. The slope shows the opportunity cost of producing clothing, which increases as more clothing is produced.



(ii) The *TT′* schedule is negatively sloped. To produce more food than indicated by point *A* on curve *TT′*, some current production of clothing must be sacrificed to release resources from clothing into the food industry.

(iii) A point such as *C* could be produced. For example, during the depression of the 1930s, most industrial countries faced severe unemployment of labor and capital equipment. Perhaps less obvious is the possibility that the combination of production shown by *C* can occur *even with* full employment of all resources. Point *C* might represent the outcome of an arbitrary across-the-board decision by a central planning authority to employ exactly 68 percent of every factor of production in the clothing industry, with the remaining 32 percent producing food. Such a decision would not take into account the fact that some resources are especially productive in one sector and not in the other, or more generally, the fact that techniques of producing clothing are qualitatively different from those of producing food. An economic answer lurks behind the question of how to allocate the community's resources most efficiently, and one of the strong arguments in favor of using the price system and competitive markets is that it causes society's production of commodities to be efficient, thus lying on the production-possibilities curve.

(iv) The *TT′* schedule bows out from the origin, reflecting the so-called *law of increasing costs*. That is, this shape embodies the assumption that the opportunity costs of obtaining an additional unit of a commodity increase as more of that commodity is produced.

What accounts for the general relationship whereby the opportunity cost of any commodity rises as its output increases? Some factors, such as highly skilled labor

especially trained to produce clothing, may be fully employed already in clothing production so that a further expansion in clothing production will rely on less-skilled labor released from food production. Even if each factor has the same potential skills in one occupation as in another, the fact that the two industries may require inputs such as labor and capital in different proportions is sufficient to generate increasing costs. (Chapters 5 and 6 explore these issues in more detail.)

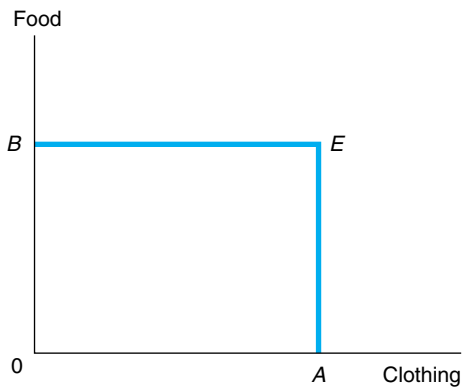
Some productive processes may, at least for a range of outputs, exhibit what is known as increasing returns to scale (see Chapter 7). That is, costs per unit produced may fall as output expands. Here we emphasize that even if such economies of scale prevail, they may not be sufficiently strong to overcome the tendency for *opportunity* costs to increase as a result of industries requiring different factor proportions and/or the variability of factors' aptitudes in different occupations. We continue to assume that the transformation curve for the economy is in general bowed out.

Special Cases

Two special cases warrant separate diagrams. Figure 2.4(a) illustrates the case in which resources find it impossible to be reallocated from sector to sector. Full employment is found at point *E*, and even if prices change, outputs do not. That is, supply curves would be vertical. This is like the situation portrayed in Figures 2.1 and 2.2 where point *E* reflects fixed production. One reason this case is important is that we show that such an economy gains in the move from autarky (no international trade) to free trade, *despite* the fact that no consequent change takes place in the production of commodities. Indeed, in such a case it is impossible to identify the *costs* of production.

FIGURE 2.4

Transformation Schedules: Special Cases



(a) Fixed Allocation of Resources

Any price changes leave production at point *E*.

(b) Linear Schedule

If clothing's relative price is higher (lower) than shown by the slope of line *BA*, representing the economy's transformation schedule, production takes place at point *A* (point *B*).

The second special case is illustrated in Figure 2.4(b). The transformation schedule is a downward-sloping straight line. That is, if clothing production increases, the opportunity cost reflected in foregone production of food remains constant. This case is associated with the name of David Ricardo and is pursued in detail in Chapter 4.

2.3 Gains from Trade and Free-Trade Equilibrium

We begin by showing how two countries can each gain from trade even in the case in which price changes cannot lead to any changes in production. For this setting a possible free-trade equilibrium is illustrated in Figures 2.5 and 2.6, where the indifference curves illustrated for each country are assumed to possess the same properties as those for an individual. (Later we discuss international trading possibilities for a country composed of individuals with dissimilar demand conditions). When no international trade is allowed, the slope of the home country's indifference curve at E (and the foreign country's at E^*) must reflect relative commodity prices in the no-trade state of autarky. In the home country's Figure 2.5, two budget lines are drawn through E: line CED and line AEB. They each represent a different set of relative prices, with food relatively cheaper (and thus clothing relatively more expensive) along CED than along AEB. For each relative price (and associated budget line) there is a most-preferred consumption point if the community can exchange commodities at those prices. For example, point F is the best consumption point along line CED; all other points would lie on lower indifference curves than curve y_1. Note that consumption could not reach point F if the community were not allowed to trade with other nations, for it would then be forced to consume food and clothing precisely in the amounts locally available (as shown by E). The slope of line AEB shows the relative price of clothing that must

FIGURE 2.5

The Trade Triangle for the Home Country

The home country originally consumes its endowment bundle, E, at relative prices shown by line AB. If it could trade at prices shown by line CD, it could export GE units of clothing to obtain FG units of food, thus consuming the bundle shown by F and improving its real income to the level indicated by the y_1 indifference curve.

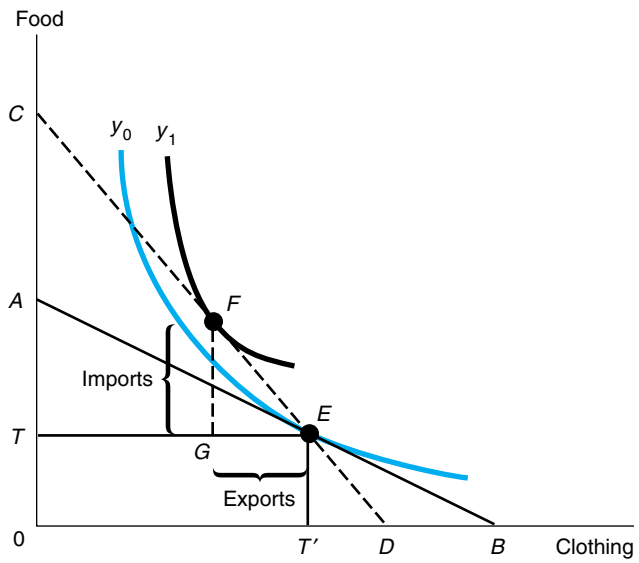
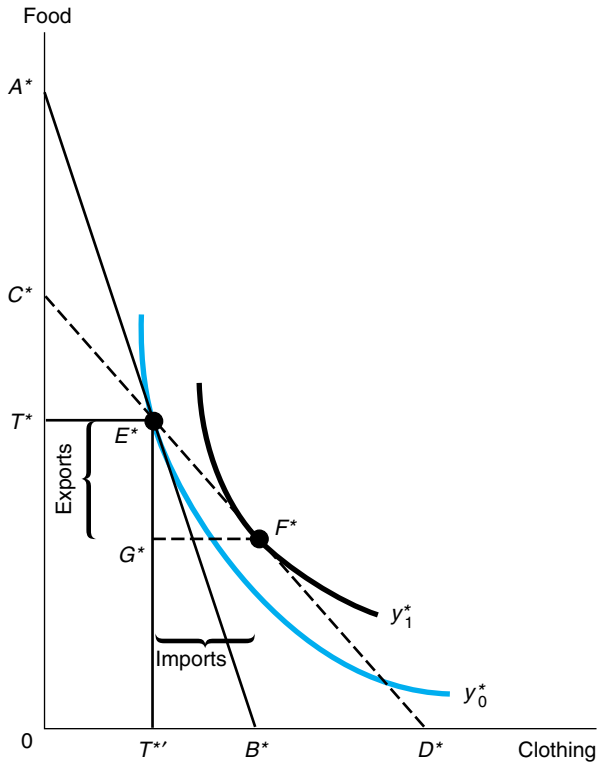


FIGURE 2.6

The Trade Triangle for the Foreign Country

The foreign country consumes its endowment bundle, E^*, at relative prices shown by line A^*B^*. If it could trade at prices shown by line C^*D^*, it could export E^*G^* units of food to obtain G^*F^* units of clothing, thus consuming the bundle shown by F^* and improving its real income to the level shown by the y_1^* indifference curve.



exist if trade is disallowed. At no other price would the community be content to consume food and clothing in the proportions indicated by point E.

Line CED in Figure 2.5 illustrates the possibilities open to this community to trade at relative prices different from those prevailing before trade. The community then could offer to export GE units of clothing, which have the same market value as FG units of food. Such trade would allow the community to consume the bundle F, on the indifference curve y_1. This indifference curve is higher than the original curve, y_0, passing through the endowment bundle. Thus:

> *the opportunity to trade at relative prices different from those in isolation at home must improve real incomes at home.*

Figure 2.6 illustrates the foreign country's behavior both in autarky and if trading opportunities along line $C^*E^*D^*$ are made available (it has the same slope as line CED in Figure 2.5 for the home country). Along budget line $C^*E^*D^*$ the foreign country's most desired consumption point is F^*. It would be willing to export E^*G^* of food (equal to FG in Figure 2.5). Thus these figures and the associated trade triangle illustrate that:

> *A divergence in the relative price of commodities in the two countries before trade indicates a mutual potential gain from trade for both countries at a common intermediate price ratio.*

Something for Nothing?

Does this discussion have a something-for-nothing flavor to it? Recall that as a consequence of our strict assumption that no interindustry resource transfers are allowed, letting countries trade with each other keeps world totals of each commodity unchanged. And yet both countries gain from trade. This is a powerful result, for it suggests that in talking of world trade we are *not* referring to a zero-sum situation, in which one country's gains are at the expense of another country's losses. Opening up markets to trade can increase consumer satisfaction every bit as much as producing more commodities. Trade need not involve one set of countries exploiting another.

Example: A POW Camp

Shortly after World War II, R. A. Radford, an Allied prisoner of war in Italian and German prison camps for several years, published an account of the manner in which markets developed among prisoners in order to exchange endowments that had originated primarily from fairly even allocations of Red Cross parcels.[2] Taste differences stimulated active trade flows within each camp. An item such as cigarettes, found regularly in the parcels, would be in heavy demand by some and would offer virtually zero value for others—except as a medium of exchange. Of special note for our purposes is Radford's observation that different national groups on average had different tastes. As a consequence they supported different relative prices. Any individual with access to more than one such group could make great gains by arbitraging among the price differences. (*Arbitrage* refers to the act of buying and selling in two markets in which prices differ, thus guaranteeing that gains can be made.) Radford describes a priest who started with a tin of cheese and five cigarettes and converted them into a sizable hoard by this activity. Coffee was relatively more expensive in French camps, tea in English and Canadian ones. If these camps were connected by a common price system, all would gain. If the camps were kept separate, some of the potential gains would accrue to arbitragers. As Radford emphasized, this was an economy in which production virtually did not exist. The gains from trade (that is, the gains to arbitrageurs) derived from differences in individual evaluations of initial endowments.

Gains from Trade with Resource Reallocation

Figures 2.7 and 2.8 repeat the argument for mutual gains from trade when transformation schedules are bowed out and international trading equilibrium is attained at a common terms of trade that coaxes each country to alter its production pattern by reallocating production toward greater output of the commodity that has become higher priced in trade. This commodity is clothing for the home country and food for the foreign country.

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[2]R. A. Radford, "The Economic Organization of a P.O.W. Camp," *Economica,* 12 (November 1945): 189–201.

FIGURE 2.7

The Trade Triangle in the Home Country

With free-trade prices shown by the slope of line 2, production at home takes place at *A* and consumption at *B*. *BDA* is the trade triangle. The community exports *DA* units of clothing in exchange for imports of *BD* units of food. Autarky consumption and production are at point *E*, with autarky prices shown by line 1.

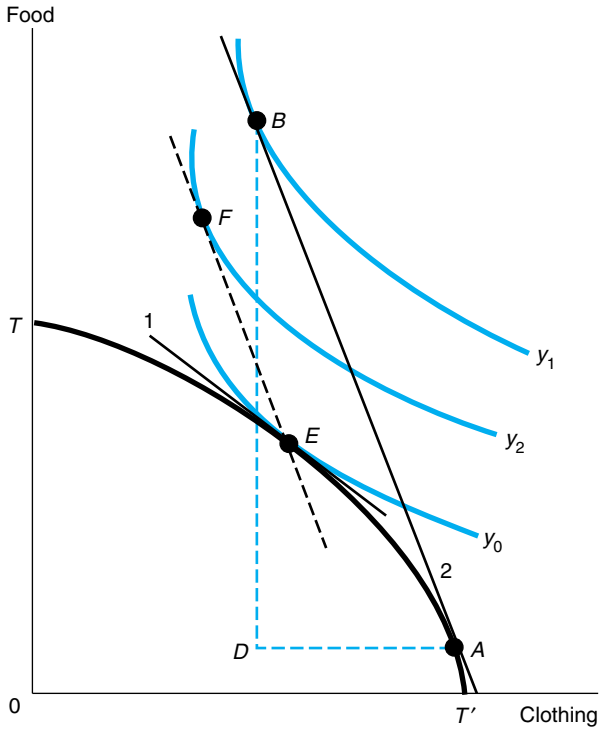


Figure 2.7 shows the consequence of trade for the home country. If the home country is not allowed to engage in international trade, its consumption possibilities are restricted to points on its transformation schedule, TT'; of these the best is shown by point E, where indifference curve y_0 is tangent to TT'. The pretrade relative price of clothing that clears the local market is shown by the slope of line 1. Suppose that with the opening of trade world prices are shown by the slope of line 2. Because clothing is relatively expensive abroad, free trade encourages resources to flow from food production into the clothing industry until local marginal costs equal world prices (at point A). Line 2 shows the new expanded locus of consumption possibilities, and the most desired consumption bundle along this line is point B. At these prices the community desires to export DA of its clothing output in exchange for BD imports of food. BDA represents the trade triangle.

The gains from trade are shown by the increase in real income, moving from curve y_0 to the higher curve, y_1. If resources were frozen into their occupations at point E, the country still would gain from trade with the consumption point moving from E on curve y_0 to F on curve y_2. The movement in consumption from F on y_2 to B on y_1 shows the *extra* gains provided by trade when production is allowed to change from E to A.

World prices are determined by supply and demand in both countries. In a free-trade equilibrium the home country's import demand for food must be matched by the foreign country's willingness to export the same quantity of food. If price line 2 in

FIGURE 2.8

The Trade Triangle in the Foreign Country

The slope of line 2 is the same as in Figure 2.7. Trade is balanced as the foreign country's trade triangle, *A*D*B**, matches the home country's *BDA* in Figure 2.7.

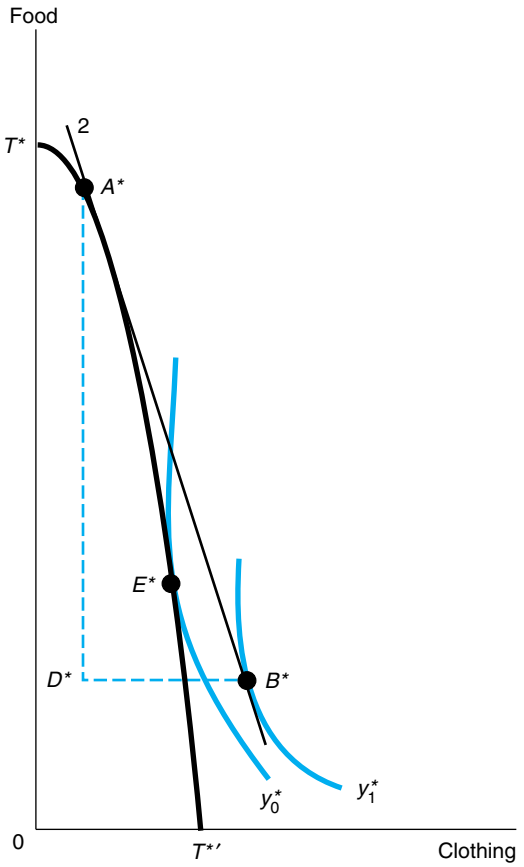


Figure 2.7 is to reflect an *equilibrium* price ratio, trade triangle *BDA* must find its mirror image in the foreign country. That is, production and consumption decisions abroad must show matching amounts, as in Figure 2.8. The foreign country also gains from trade, with the change in consumption from E^* to B^* entailing a rise in real incomes abroad from level y_0^* to y_1^*. Foreign exports of A^*D^* of food match home imports of BD. The slope of A^*B^* is, of course, the same as the slope of BA in Figure 2.7.

In comparing this illustration of mutual gains from trade with our earlier diagrammatic treatment (Figures 2.5 and 2.6), note not only that the gains from free trade are greater for each country if resources can be reallocated toward the better location suggested by trade, but that relative commodity prices now reflect both the trade-offs along indifference curves and also the opportunity costs measured by slopes of the transformation schedules. For example, in Figure 2.7 the autarky relative price at home is illustrated by the opportunity cost of producing another unit of clothing at point E, measured not in dollars or hours of labor but in terms of the quantity of food that would have to be reduced in order to release the resources sufficient to produce the extra unit of clothing. Once opening international markets makes trade-offs along price line 2 possible, the higher relative price for clothing encourages its greater production at point A.

Comparative Advantage and Comparative Costs

The illustration of mutual gains in Figures 2.5 and 2.6 suggests the technical term *comparative advantage*. A country has a comparative advantage in a commodity if, in autarky, that commodity is relatively less expensive than in the other country. Put this way, it is clear that as long as autarky relative prices are not identical between countries, each country must have a comparative advantage in some commodity, and trade patterns according to comparative advantage lead to mutual gains. What the illustrations in Figures 2.7 and 2.8 suggest is that these price ratios can often be linked to relative costs of production. This leads to a new technical term, *comparative costs*, and the famous *doctrine of comparative costs: A country gains from international trade by exporting the commodity in which its costs are comparatively lower than in the other country*.

If resources cannot be reallocated, as in Figures 2.5 and 2.6, countries still gain from trade that is aligned with positions of comparative advantage. Once comparative costs can be identified, a new issue arises. Must a country have superior productivity in producing the commodity in which its comparative costs are lower? Not necessarily. This was the great observation made by economist David Ricardo in the early nineteenth century, for it suggested that a general inferiority in productive skills did not mean a country could not find export markets for some of its products. A technically inferior labor force, for example, has lower wage rates than in a superior country, but if the extent of inferiority is relatively different from one commodity to another, trade according to comparative advantage does lead to mutual gains. Professor Paul Samuelson of the Massachusetts Institute of Technology, America's first Nobel laureate in economics, once remarked that in his youth when with the Society of Fellows at Harvard, he was challenged by the eminent mathematician, Stanislaw Ulam, to mention one proposition in the social sciences that was true but not trivial. It was only later that Samuelson realized that the doctrine of comparative advantage was the perfect response to this challenge. It is easy to find many people in academia (ideally not economists), business, the media, and politics, who refuse to believe a country that faces rivals with lower wage rates can benefit from international trade.[3] As well, there are those who do not understand that a country with lower productivity in producing food may nonetheless be able to gain by exporting food to a country whose productivity is higher.

Issues regarding productivity are explored in depth in Part II. Here it is important to recognize that comparative costs are measured by the amount of one commodity (say, food) that must be reduced in production in order to release resources to produce an extra unit of the other commodity (clothing). If resource use is frozen, such as depicted in Figures 2.5 and 2.6, such cost measures do not exist, but taste patterns suffice to reveal which country has a comparative advantage in clothing.

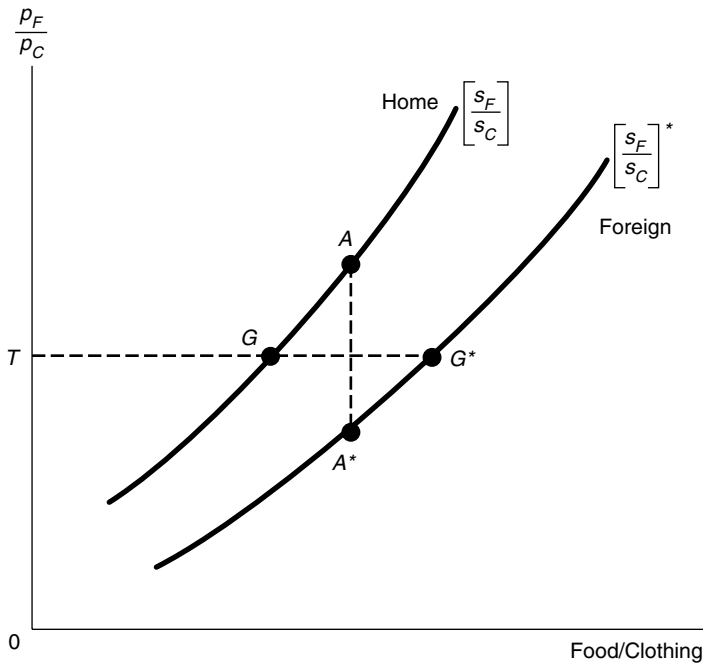
A glance at Figures 2.7 and 2.8 reveals the strong bias in the transformation schedules—the home country's curve has been drawn flatter than the foreign country's. This (arbitrary) assumption allows us to speak of a production bias toward the home country possessing a comparative advantage in producing clothing. Note the double comparison

[3]Paul Samuelson, "The Way of an Economist," original talk in 1968, reprinted in R. Merton (ed.), *The Collected Scientific Papers of Paul A. Samuelson*, vol. 3 (Cambridge, MA: MIT Press, 1972).

FIGURE 2.9

Comparative Advantage

The pair of relative supply curves illustrates the production bias in favor of the foreign country possessing a comparative advantage in producing food. If tastes are comparable, positions of comparative advantage and the trade pattern (foreign country exports food) are consistent with the production bias.



involved. It is the pretrade cost ratio (p_C/p_F) in one country as opposed to another that is the object of comparison in determining comparative advantage.

Figure 2.9 illustrates the production bias found in Figures 2.7 and 2.8. At this stage of the discussion, we deliberately ignore relative country size as a material consideration in affecting relative costs and concentrate on the composition of demand and production by showing how *ratios* of food to clothing respond to relative prices. Figure 2.9 shows that for any price ratio faced in common by both countries—for example, free-trade price ratio $0T$—the foreign country would, in a competitive market, produce relatively more food at G^* than the home country would at G. A vertical comparison of these supply curves shows that if both countries attempt to produce goods in the same proportion, the relative cost of producing food abroad, at A^*, would be lower than at home, at A. How about the *demand* side of the market? If taste patterns were identical and captured by a common downward sloping relative demand curve in Figure 2.9, the autarky price of food at home would have to be higher than that found abroad. However, it is possible to conceive of a situation in which demand patterns differ so much between countries that food is relatively inexpensive at home before trade. Both demand and supply conditions affect positions of comparative advantage, although we generally consider supply conditions to be more important.

What causes a production bias between countries? Part II develops the rationale along two different lines: The foreign country possesses relatively superior technical knowledge required to produce food, and/or the foreign country is relatively well endowed with those productive factors that are especially well suited to food production.

2.4 Winners and Losers: Autarky to Free Trade

If a country is made up of individuals with different incomes or tastes, opening up the country to international trade may hurt some people. Perhaps images come to mind of skilled American workers undercut by cheaper foreign labor or nineteenth-century British landlords seeing their rents suffer as low-cost sources of food are opened up abroad. Take a close look at what happens in most communities before they engage in trade with other countries: Individuals at home will be trading with each other, and some equilibrium price ratio will be established at which all the net sellers of clothing will find purchasers who are willing to give up an equivalent value of food in exchange. Now suppose the community has an opportunity to trade in food and clothing with the outside world, and suppose that food is relatively cheap abroad (and clothing relatively expensive). Not everyone at home need gain by this new trading opportunity. Indeed, the potential losers are easy to identify—all the individuals who were net sellers of food at home before world trade is opened up.

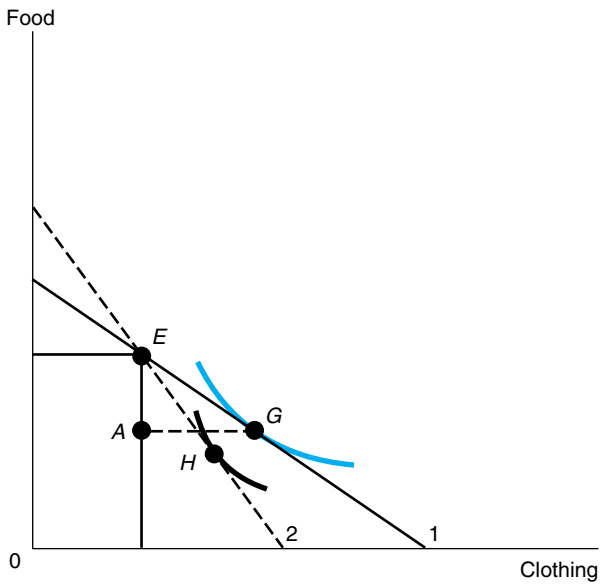
The situation of one of these individuals is shown in Figure 2.10. Owning the bundle of food and clothing shown by E, the individual "exports" EA units of food (to fellow citizens) in order to purchase AG units of clothing. International trade lowers the relative price of food; the individual's budget line rotates from line 1 to line 2 (around the endowment point E). Consumption is reduced from G to H, and the individual is unquestionably worse off.

If some individuals gain from opening up their country to international trade while others lose, what can be said about the community as a whole? This is an issue typically faced in the political realm, where decisions (in this case, trade policy) almost

FIGURE 2.10

International Trade Can Hurt

This individual is a net seller of food (amount *EA*) at home in autarky, with home prices shown by line 1. With food relatively cheaper on world markets (line 2), the individual's consumption is reduced from *G* to *H*. The individual is hurt by international trade.



always entail some groups being hurt and others gaining. Although the typical result in such cases is that some groups *do* get hurt while others gain, the economist is tempted to ask about the *possibility* of compensation so that all parties can gain by the move.

A Compensation Scheme

This line of argument is worth pursuing because it *is* possible to design a scheme whereby all individuals who would lose by a move from no international trade to free international trade can be compensated by those individuals who stand to gain by such a move, with the original gainers still better off after paying the compensation. The redistribution scheme involves switching the original endowment point for each individual to the consumption point that would be chosen when internal trade (but not international trade) is allowed. Thus, in Figure 2.10 the individual is compensated by an addition of AG units of clothing while a sacrifice of AE units of food is made, thus switching the "endowment" point from E to G. Are there enough supplies of food and clothing to go around? Yes, because the local market was originally cleared. Now open the community to international trade. With prices different in the world market, every individual can gain by a move from that person's new, "compensated" endowment point. Free trade, with compensation, benefits everyone.[4]

To summarize, everyone stands to gain from trade as such, even in this simple setting. The move from local trade to more extended international trade can be defended if one ignores the local redistribution of income or makes appropriate compensations. However, it is precisely this redistribution that often causes such controversy over new initiatives in the trade area. We seldom witness a country debating whether to engage at all in trade with other countries (nineteenth-century Japan aside), but we have witnessed Britain's original agony in deciding whether to enter the European Community (now the European Union) and special-interest groups lobbying the U.S. Congress for protection from imports. Even when sharp changes in international prices are described in crisis terms, they are not harmful to all. How should an American shareholder in a major oil company feel about the renewed energy crisis in the early years of this century? Would such views be shared by a nonstockholding neighbor? Countries in the European Union (EU) have high levels of protection for agricultural commodities. If you were not a farmer, would you be in favor of these?

Free Trade in North and Central America

The Canadian parliamentary election held in 1988 was one of the most animated and hard-fought in recent history. One issue—free trade—dominated, and it split the electorate. Explicitly, the question was this: Should Canada proceed to ratify an agreement

[4]For the individual in Figure 2.10, the budget line appropriate to world prices now passes through G, with the same slope as line 2. Trade now will clearly benefit such a person. Of course, those who were originally clothing exporters do not gain as much as they would have if there were no compensation, but they still gain to some extent.

with its large southern neighbor whereby remaining tariff barriers to goods traveling between the United States and Canada would be gradually abolished over the next ten years? The agreement, already passed through the U.S. Congress, awaited only Canadian approval. The anti-free-trade forces seemed to tap a raw nerve in the Canadian electorate when they predicted that such a move would endanger Canadian sovereignty and interfere with Canada's ability to follow its own social programs and maintain its own cultural identity. The election returns in Canada's three-party system provided a parliamentary majority for the Progressive Conservative party, which had negotiated the agreement, despite the fact that less than 50 percent of those voting seemed to favor the proposal. The issue of free trade proved enormously divisive.

The possibility of pursuing a North American Free Trade Area that included Mexico led to the 1993 agreement, but not before the issue of NAFTA was hotly debated in the U.S. Congress and in the media. Fears that U.S. jobs would be lost to lower-paid Mexican labor were captured by Ross Perot, the independent presidential candidate in the 1992 election, who referred to the "giant sucking sound" that would be heard. Others argued that such a sound was really that of Mexicans drinking Coca-Cola through straws—suggesting that U.S. exports to Mexico would be greatly stimulated by NAFTA, which is what happened. We have more to say about NAFTA as well as the 2005 agreement to form CAFTA, the Central America Free Trade Agreement, in Part III.

2.5 Summary

The advantage of allowing countries to engage in the free trade of commodities has been shown to hold even in the stripped-down setting of two countries and two commodities. The key to understanding the gains from trade is the situation of these countries before they engage in trade: The relative price of clothing in each country is determined by that country's own supply and demand patterns and is probably different between the two countries. If so, they each can gain by trading at a price ratio lying between the two autarky ratios.

Although we have argued that a country can gain from trade, not every individual or group within a country need share in these gains. Suppose the home country imports food as a consequence of its lower price once it engages in trade. Such a price drop would tend to hurt local suppliers of food. We have shown how compensation could be possible so that *every* individual gains from trade, but such compensation schemes are rarely undertaken. As a consequence, in almost every country there will be groups strongly opposed to any moves toward freer trade. Such opposition to free trade need not be seen as ignorance on the part of opponents. It may represent an awareness on the part of such groups that, at least in the short run, freer trade endangers their own real incomes. But of course almost any change in technology, tastes, or endowments creates losers as well as winners, and trade is no exception.

CHAPTER PROBLEMS

1. With reference to the home country's trade triangle illustrated in Figure 2.5, suppose the world relative price of clothing stays at the slope shown by line *CED*. How would the home country's volume of imports and exports be altered if (a) a fire destroyed 10 percent of its clothing endowment, or (b) a bumper harvest expanded its food production by 10 percent?
2. Referring to the previous exercise, if a fire destroys quantity *GE* of clothing in Figure 2.5, will the home country cease to trade if the world relative price of clothing is shown (again) by the slope of line *CED*?
3. In a pair of diagrams such as Figures 2.7 and 2.8, illustrate the mutual gains from trade if (a) tastes are similar between countries but transformation schedules differ, and (b) tastes are different but transformation curves are the same.
4. The home country in Figure 2.7 is shown to respond to the trading opportunities indicated by line 2 by increasing production of clothing (from *E* to *A*) and actually reducing the quantity of clothing consumed. Show why:
   - **a.** For a country in which production cannot change (e.g., the home country in Figure 2.5), trade *must* result in a drop in consumption of the good exported.
   - **b.** If production can respond to new world prices as in Figure 2.7, the quantity of clothing consumed at home could increase.
   - **c.** In Figure 2.7 reduction in clothing consumption results in an increase in well-being, compared with taking advantage of trade to consume more of both commodities.
5. Some consumers have quite rigid taste patterns. Suppose the indifference curves for a community are strictly right-angled, and the corner of each ever-higher indifference curve lies on a ray from the origin. To be precise, suppose that whatever the prices prevailing in the market, two units of food are demanded for each unit of clothing demanded. Furthermore, suppose the transformation schedule shows considerable flexibility in production, so much so that it is a downward-sloping straight line such as in Figure 2.4(b), with a vertical food intercept of 20 units and a horizontal clothing intercept of 40 units.
   - **a.** If the country cannot engage in trade, how much of each commodity does it consume and produce?
   - **b.** In the no-trade (autarky) state, what is the relative price of food?
   - **c.** Suppose world trade is now opened up and the relative price of clothing is double what it was in autarky. Describe what happens to consumption and production.
   - **d.** Is the country better off with trade?
6. The individual whose tastes are shown by the indifference curves in Figure 2.10 is a net seller of food at autarky home prices, shown by line 1. This individual loses if trade with the rest of the world is allowed and food prices are lower there, shown by line 2. Show how this same individual might gain if the world price of food is even lower than that shown by line 2.

APPENDIX A

The Box Diagram

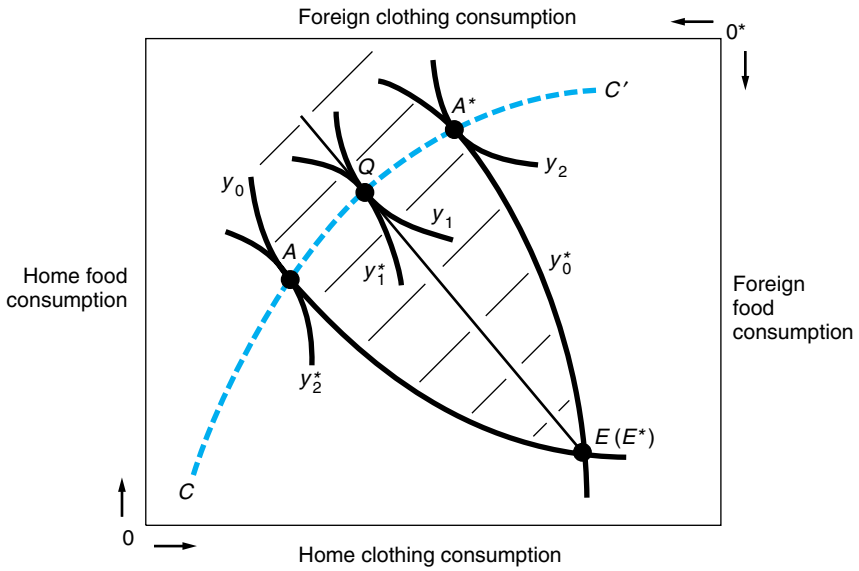
Economists devised the box diagram to illustrate welfare propositions in those cases in which the distribution between participants of fixed total bundles of commodities is at issue. These fixed total supplies provide the dimensions of the box.[5]

In Figure 2.A.1 any point within the box can represent a division of the fixed world totals between two nations, where these commodities are assumed to be identical between countries. For example, point $E(E^*)$ shows the original endowment allocation. Measure quantities belonging to the home country with respect to the southwest 0 origin, and those belonging to the foreign country with respect to the northeast 0* origin. A pair of indifference curves is drawn through endowment point $E(E^*)$. The curve y_0 for the home country illustrates that a consumption bundle such as A would be valued exactly as highly by the home country as would endowment point E. The shape of the foreign indifference curve y_0^* through E^* is explained by the measurement of foreign clothing consumption leftward from 0* and foreign food consumption downward from 0*. Consumption at point A^* means as much to foreigners as does

FIGURE 2.A.1

The Box Diagram and the Contract Curve

The *CC′* curve is the contract curve, which is the locus of all points where an indifference curve of the home country is tangent to an indifference curve of the foreign country. Point *Q* represents free-trade equilibrium.



[5]One reason for studying a model of fixed production first is that it reveals the basic nature of the gains from trade, independent of any additional gains that can be obtained if trade causes resources to be reallocated to increase world outputs.

endowment point E^* because they both lie on curve y_0^*. Note that any redistribution of the world totals between countries that lies in the shaded area between curves y_0 and y_0^* represents an improvement in welfare for *both*. Free trade leads to one such point of mutual welfare gains.

The CC' curve is the locus of all distributions that equate marginal rates of substitution between countries. That is, move along any indifference curve for the home country (for example, y_0) until you find a point where a foreign indifference curve is tangent to it (point A has foreign curve y_2^* tangent to home curve y_0). This point is especially significant: It shows the redistribution that obtains the maximum welfare abroad that is possible without altering welfare at home. The contract curve CC' collects all points of mutual tangency. From any point off the contract curve (for example, E) it would be possible to redistribute commodities and to improve welfare in *both* countries. (Anywhere in the shaded area would do.) From any point on the contract curve it is still possible to make one country better off, but not without inflicting harm on the other. All points on the contract curve thus pass the efficiency test.

Free trade leads to a world consumption point at which marginal rates of substitution in each country are equated to a common price ratio, shown by the slope of line QE in Figure 2.A.1. The free-trade point is on the contract curve. Free trade raises the welfare of both participants and leaves the world at a point from which further mutual gains are not possible.

Granted that free trade leads to an efficient point on the contract curve, is it the best such point? Countries obviously will disagree over this issue because other points involve a gain for one country (but a loss to the other). A more pertinent question is whether either country might be tempted to try (and perhaps to succeed) to improve its level of well-being beyond that obtainable at free trade. Later discussions of the application of tariffs, quotas, and other instruments of commercial policy explore this issue. Even in the stripped-down illustration of free trade represented by point Q in Figure 2.A.1, however, two points can be made: (1) Any measures taken by one country that cause its welfare level to rise above the free-trade level must harm the other country. (2) Any such measure will prove inefficient from a world standpoint if it pushes the equilibrium point off the contract curve. This comment needs to be stressed because most devices employed by countries attempting to maneuver to a better position than that obtainable with free trade introduce price distortions that do push the trading point away from the contract curve.

APPENDIX B

Substitution and Income Effects

When a country is already engaged in international trade, any change in the terms of trade encourages resource reallocations and has an effect on consumer demand. The analysis of consumer response to price changes breaks behavior into two parts—substitution effects and income effects. For this review, assume production remains fixed.

There are two important aspects of the income effect on demand when price changes: (1) determining how real income is affected by the price change, and (2) determining what the impact of a given change in real income is on demand for importables. The latter reflects only the consumer preference pattern. Revert for the moment to the practice of quoting incomes and prices in dollar units. If income rises by $100 and spending on food (the good being imported) rises by $40, by definition, the *marginal propensity to import* (food) is 0.4. The answer to (1) depends greatly on the extent of trade. The greater the quantity of food currently imported, the more severely will real incomes be hit by a rise in food's relative price.

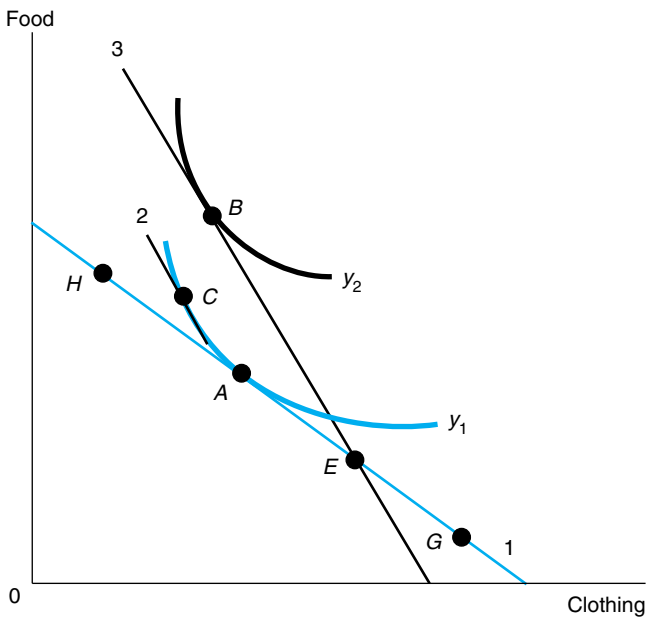
These points are illustrated in Figure 2.B.1. Suppose that production is fixed at point *E* and initially the home country imports food at the price ratio shown by line 1, consuming at *A*. Now let the terms of trade improve. The price reduction for imports is shown by the slope of a steeper line (2 or 3, which are parallel). With the budget line rotating around production point *E*, consumption of food rises from *A* to *B*. This demand change can be broken down into two parts: (1) The move from *A* to *C* is the *substitution effect;* that is, the change in demand if consumption is restricted to the same indifference curve, and (2) the move from *C* to *B* is the *income effect*. A fall in import prices raises real income (from curve y_1 to curve y_2). The income effect shows how such an increase in real income at constant prices spills into increased demand for both commodities.

Remember that the income effect is strongly influenced by the extent (and direction) of trade. To illustrate, consider the following exercise: In Figure 2.B.1 suppose that the production point is *G* instead of point *E*; that is, suppose imports of food initially are roughly twice the amount illustrated (distance *AG* is roughly twice the distance

FIGURE 2.B.1

Substitution and Income Effects

With point *E* the production point, consumption is initially at *A* at terms of trade shown by line 1. A fall in food's import price is shown by steeper lines 2 or 3. The substitution effect is the move from *A* to *C* along the initial indifference curve. The income effect is the move from *C* to *B*.



AE). Then show, by drawing the new budget line through *G*, that the drop in food prices raises real income by more than previously shown (indeed, by roughly twice as much).

This discussion illustrates an important general point: For a country engaged in trade, any price change of traded goods affects real income:

> *The extent of the impact of a change in the terms of trade on real income is proportional both to the extent of the price change and to the original volume of trade.*

These basic points find many applications throughout this book. Appendix C relates these changes to the elasticity of import demand as well as including production changes along the offer curve.

APPENDIX C

The Offer Curve Diagram

Many diagrams used to show free-trade equilibrium and the pattern of trade illustrate directly how quantities demanded and supplied respond to relative prices. An alternative diagrammatic apparatus contrasts directly the quantity of one commodity a country wishes to import against the quantity of the commodity offered in exchange as exports. Retaining the assumption that the home country is an exporter of clothing in a free-trade equilibrium, Figure 2.C.1 illustrates the *offer curves* for the two countries.

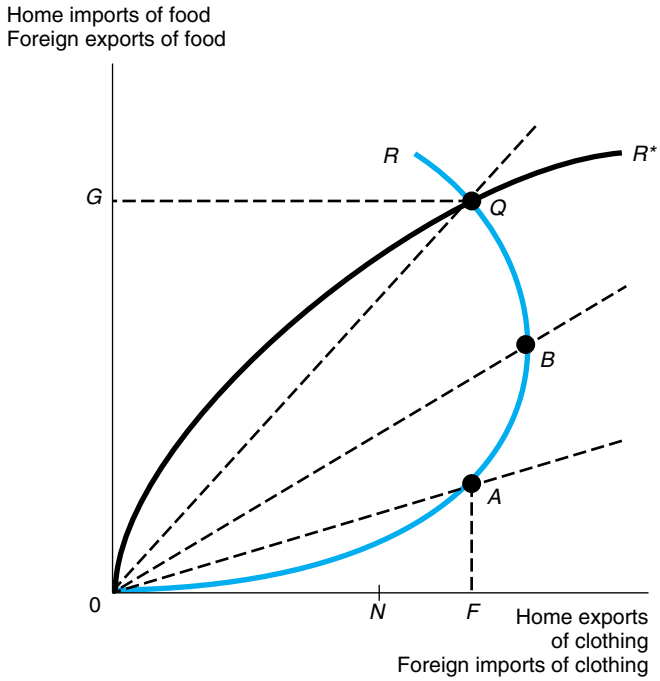
Because quantities are shown along the axes, relative prices are indicated in this diagram by the slopes of the rays from the origin. Consider the home country's response to the world relative price of clothing shown by the slope of ray 0*A*. At this relative price the home country chooses to demand quantity *AF* of food over and above its local production. In order to obtain this by imports, it must be prepared to export 0*F* units of clothing, which have an equivalent value. Should the relative price of food fall to the level shown by ray 0*B*, home demand for imports of food would rise. In this range, home import demand is elastic because the quantity of clothing exports it is willing to give up increases from *A* to *B*; a rise in total revenue spent on a product when its price falls indicates an elastic demand.[6] By contrast, a further reduction in food's relative price to the ray 0*Q* shows a reduction in clothing exports. More food imports are demanded at *Q* than at *B*, but the fall in food's price is relatively more severe than the increase in quantity demanded, so that total outlay (as measured by clothing exports) has fallen. This inelasticity in import demand reflects a behind-the-scenes conflict between greater production of clothing at *Q* than at *B* (because clothing's relative price has risen) coupled with lower local demand for clothing via the substitution effect, on the one hand, and a stimulus to local demand for clothing via the income effect on the other. (The rise in clothing's relative price from *B* to *Q* raises real

[6]The elasticity of demand for imports can be shown by the offer curve in the following manner: At point *A* draw the line tangent to the offer curve. It will intersect the horizontal axis at *N*. It can be shown (consider this a useful exercise) that the elasticity of import demand at *A* is the ratio 0*F*/0*N*, which is greater than unity.

FIGURE 2.C.1

Offer Curves

Free-trade equilibrium is shown by point *Q*, with the equilibrium terms of trade equal to the slope of ray 0*Q*.



incomes for the home clothing-exporting country.) This conflict is won by the income effect in the move from *B* to *Q* and by the substitution effects in production and consumption in the move from *A* to *B*.

The foreign offer curve, 0*R**, has (arbitrarily) been drawn as elastic throughout. Decreases in the relative price of the commodity imported abroad (clothing) correspond to steadily rising import demand and export supply as clockwise-moving rays from the origin sweep the curve 0*R**. Equilibrium is attained at a price ratio (shown by ray 0*Q*) at which home demand for imports of food matches foreign supply. This equilibrium point, *Q*, also reveals that foreign demand for clothing imports matches home export supply.