The Pure Theory of International Trade: Supply

3.1 COMPARATIVE ADVANTAGE AND OPPORTUNITY COSTS

In Section 1.6, we saw that Ricardo based his law of comparative advantage on the labor theory of value, which is unacceptable. However, the law of comparative advantage can be explained in terms of the *opportunity cost theory*. This says that the cost of a commodity is the amount of a second commodity that must be given up in order to release just enough factors of production or resources to be able to produce one additional unit of the first commodity. Note that here neither is labor the only factor of production nor is it assumed that the cost or price of a commodity can be inferred from its labor content or that labor is homogeneous. The nation with the lower opportunity cost for a commodity has a comparative advantage in that commodity and a comparative disadvantage in the other commodity.

EXAMPLE 1. If to produce one additional unit of cloth the U.K. must forgo ½ unit of wheat (in order to release just enough resources to produce the additional unit of cloth), the opportunity cost of cloth in the U.K. is ½ unit of wheat. If at the same time the U.S. (in the absence of trade) must forgo 2W to produce 1C more, the opportunity cost of 1C is 2W in the U.S. Since the opportunity cost of cloth is lower in the U.K. than in the U.S., the U.K. has a comparative cost advantage over the U.S. in cloth and the U.S. has a comparative advantage in wheat.

3.2 THE PRODUCTION POSSIBILITIES CURVE: CONSTANT COSTS

Opportunity costs can be illustrated with the *production possibilities curve* (also called the transformation curve). This shows all the various *alternative* combinations of the two commodities that a nation can produce by fully utilizing all of its factors of production with the best technology available. The slope of the production possibilities curve then refers to the *marginal rate of transformation* (MRT) or to the amount of a commodity that the nation must give up in order to get one more unit of the second commodity. If the nation faces constant costs or MRT, then its production possibilities curve is a straight line with (absolute) slope equal to the *constant opportunity costs* or MRT and to the *relative commodity price* in the nation.

EXAMPLE 2. Table 2.1 gives the maximum amount of wheat *or* cloth that the U.K. and the U.S. could produce if they fully utilized all the factors of production at their disposal with the best technology available to them.

Table 2.1

	U.K.	U.S.
Wheat (millions of bushels/year)	60	160
Cloth (millions of yards/year)	120	80

If, in addition, we were told that the opportunity cost of producing wheat and cloth is constant in each nation, we would get the production possibilities curves shown in Fig. 2-1. Note that each point on the curve rep-
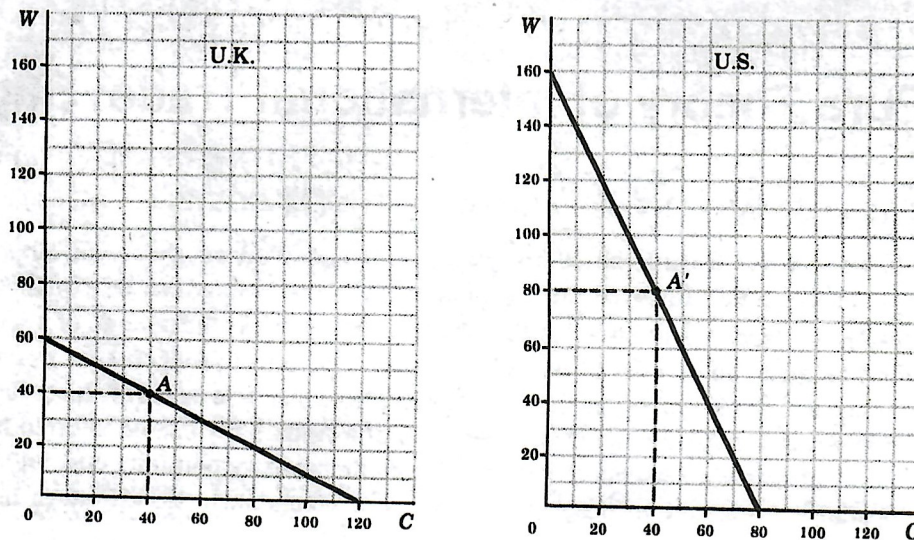
Fig. 2-1

resents one combination of wheat and cloth that the nation can produce. For example, at point A, the U.K. produces 40C and 40W. At point A', the U.S. produces 40C and 80W. The more of one commodity the nation produces, the less it is able to produce of the other (i.e., the curves are negatively sloped). Moreover, the (absolute) slope of the curve for the U.K. is

$$\frac{60}{120} = \frac{1}{2} = \text{MRT}_{CW} = \frac{P_C}{P_W}$$

and remains constant. For the U.S., the slope is

$$\frac{160}{80} = 2 = \text{MRT}_{CW} = \frac{P_C}{P_W}$$

and remains constant. Note that in the case of constant costs, the internal equilibrium P_C/P_W in each nation is determined exclusively by the supply conditions in each nation.

3\3 THE BASIS FOR TRADE AND THE GAINS FROM TRADE UNDER CONSTANT COSTS

In *autarky* or the absence of trade, a nation's production possibilities curve or frontier also represents its *consumption frontier* (i.e., the nation can consume only a combination of commodities that it can produce). With trade, however, each nation can specialize in the production of the commodity of its comparative advantage, exchange part of this for the commodity of its comparative disadvantage and end up consuming more of both commodities than without trade.

EXAMPLE 3. Suppose that in the absence of trade, the U.K. consumes (and produces) at point A while the U.S. does so at point A' in Fig. 2-2. (Points A and A' are dictated by tastes or demand conditions in each nation; these will be discussed in Chapter 3). Since in the absence of trade $\text{MRT}_{CW} = P_C/P_W = \frac{1}{2}$ (the slope of line AB) in the U.K. while $\text{MRT}_{CW} = P_C/P_W = 2$ (the slope of line $A'B'$) in the U.S., the U.K. has a comparative advan-
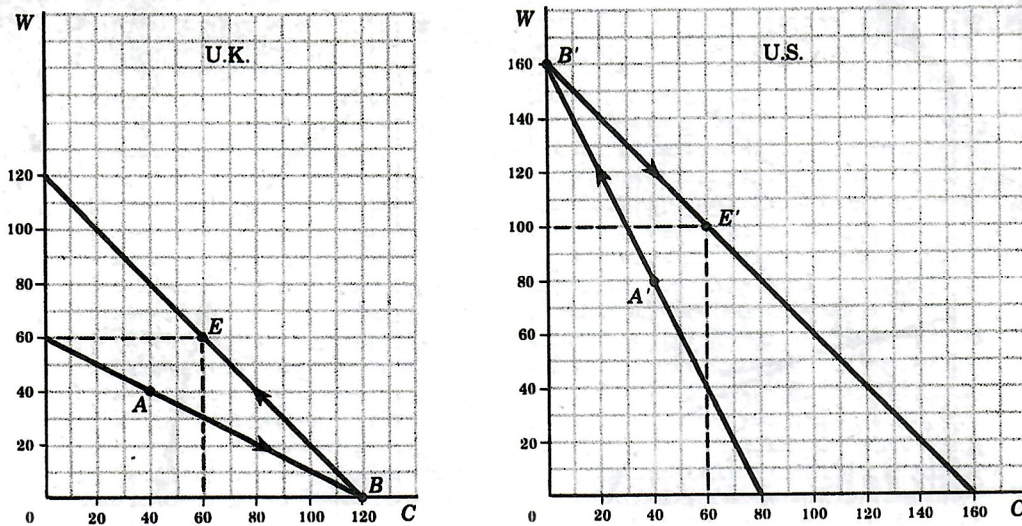
Fig. 2-2

tage in cloth and the U.S. has a comparative advantage in wheat. Mutually advantageous trade is possible within the limits: $\frac{1}{2} < P_C/P_W < 2$ (see Problem 1.15). If P_C/P_W is stabilized at 1 with trade, the U.K. can move from point A to point B in production, exchange 60 of its 120C (produced at point B) for 60W from the U.S. and end up consuming at point E (which involves a gain in consumption of 20C an 20W over its no-trade consumption point, A). The U.S., on the other hand, moves from point A' to point B' in production, exchanges 60 of its 160W (produced at point B') for 60C from the U.K. and ends up consuming at point E' (with a gain of 20C and 20W over point A'). This is one possible outcome showing that each nation can gain by specializing completely in production and then trading.

3.4 THE PRODUCTION POSSIBILITIES CURVE: INCREASING COSTS

In the real world, it is more likely for a nation to face *increasing opportunity costs* or MRT in producing more units of a commodity. This is shown by a production possibilities curve that is concave to the origin. The nation will then produce where MRT equals the equilibrium relative commodity price in the nation. In the case of increasing costs, the equilibrium relative commodity price in the nation is determined by supply *and* demand conditions in the nation. Discussed in detail in Chapter 3. Here, we simply assume an internal equilibrium relative commodity price in each nation and determine where on its production possibilities curve each nation will produce at that price.

EXAMPLE 4. Figure 2-3 gives hypothetical production possibilities curves for the U.K. and the U.S. showing increasing costs. If in the absence of trade the internal equilibrium $P_C/P_W = \frac{1}{4}$ in the U.K., the U.K. would produce at point A, where its $\text{MRT}_{CW} = P_C/P_W = \frac{1}{4}$. If P_C/P_W rises, it would pay for the U.K. to produce more cloth and less wheat (a movement along the curve in a downward direction). However, as the U.K. does this, its MRT_{CW} rises. Thus, at $P_C/P_W = 1$, the U.K. produces at point B, where its $\text{MRT}_{CW} = P_C/P_W = 1$. Similarly, with $P_C/P_W = 4$, the U.S. produces at A'. If P_C/P_W falls to 1, the U.S. will move to point B' (thus producing less cloth and more wheat). Note that at point B' the U.S. incurs a lower MRT_{CW}, which means that its reciprocal or MRT_{WC} is higher than at point A' (see Problem 2.14).
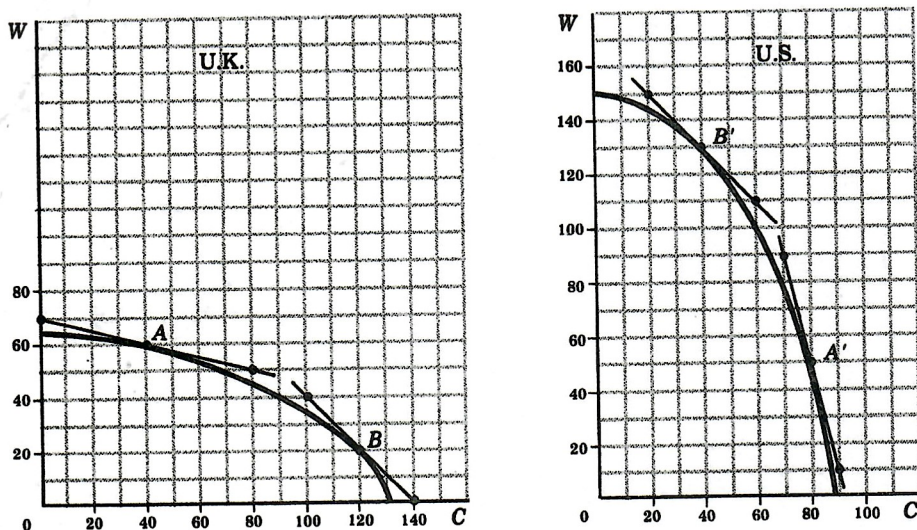
Fig. 2-3

3.5 THE BASIS FOR TRADE AND THE GAINS FROM TRADE UNDER INCREASING COSTS

Whether the production possibilities curves are straight lines or concave to the origin, there is a basis for mutually advantageous trade whenever there is a difference in the pretrade relative commodity price between the two nations. However, when the production possibilities curves are concave, as each nation specializes in the production of the commodity of its comparative advantage, it incurs higher and higher opportunity costs or MRTs. Specialization in production will continue until the rising MRT in each nation equals the relative commodity price at which trade takes place. Through trade, each nation will then end up consuming outside (and above) its no-trade consumption (and production) frontier.

EXAMPLE 5. Suppose that in the absence of trade the internal equilibrium $P_C/P_W = ¼$ in the U.K. and 4 in the U.S., so that the U.K. produces and consumes at point A while the U.S. produces and consumes at point A' (see Figs. 2-3 and 2-4). Since in the absence of trade P_C/P_W is lower in the U.K. than in the U.S., the U.K. has a comparative advantage in cloth and the U.S. in wheat. Mutually advantageous trade is possible within the limits $¼ < P_C/P_W < 4$. If P_C/P_W is stabilized at 1 with trade, the U.K. can move from point A to point B in production, exchange 60 of its 120C (produced at point B) for 60W from the U.S. and end up consuming at point E (with a gain of 20C and 20W over point A; see Fig. 2-4). The U.S., on the other hand, moves from A' to B' in production and, by exchanging 60W for 60C with the U.K., ends up at point E' (which involves 20C and 20W more than at A'). Note that as the U.K. specializes in the production of cloth, it incurs increasing costs in cloth production (i.e., a higher MRT_{CW}). Similarly, as the U.S. specializes in the production of wheat, it incurs increasing costs in wheat production (i.e., a higher MRT_{WC}). Specialization will continue in each country until its $MRT_{CW} = P_C/P_W = 1$. Also note that the U.K. and the U.S. do not specialize completely in the production of one commodity (as in the case of constant costs). Thus, with constant cost we have *complete specialization* in production, while with increasing costs we have *incomplete specialization*.

3.6 THE DETERMINANTS OF COMPARATIVE ADVANTAGE

The difference in pretrade relative commodity prices (comparative advantage) between the two nations can be based on a difference in factor endowments, technology or tastes between the two na-
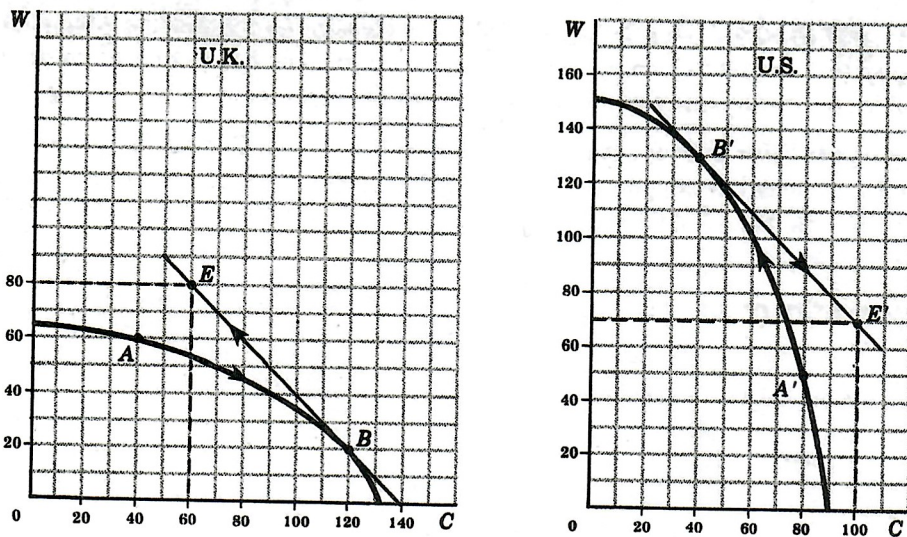
Fig. 2-4

tions. A difference in factor endowments or technology leads to a difference in the shape and location of each nation's production possibilities curve (see Fig. 2-3) which, unless neutralized by a difference in tastes, will lead to different relative commodity prices and mutually beneficial trade (see Fig. 2-4). However, even if two nations have exactly the same factor endowments and technology (and thus identical production possibilities curves), a difference in tastes can be the basis for mutually beneficial trade
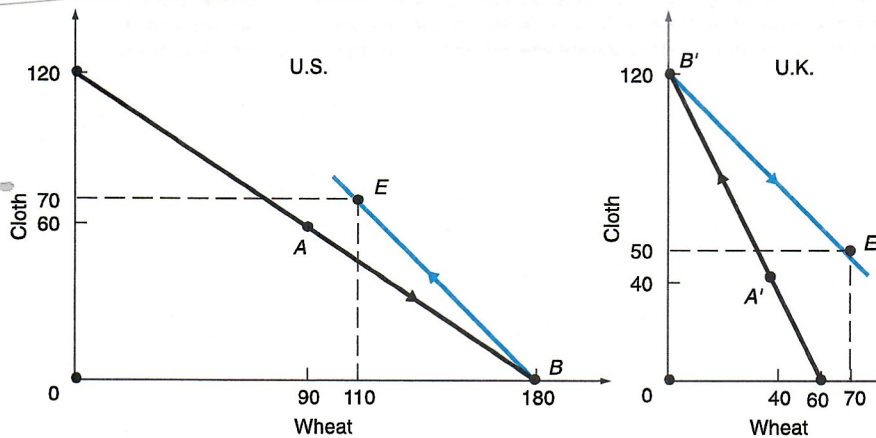
TABLE 2.4. Production Possibility Schedules for Wheat and Cloth in the United States and the United Kingdom

| United States		United Kingdom	
Wheat	Cloth	Wheat	Cloth
180	0	60	0
150	20	50	20
120	40	40	40
90	60	30	60
60	80	20	80
30	100	10	100
0	120	0	120
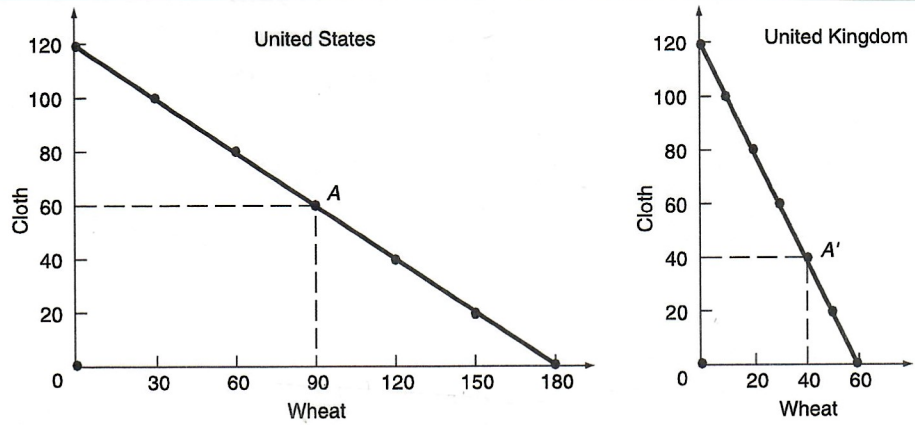
FIGURE 2.1. The Production Possibility Frontiers of the United States and the United Kingdom.

FIGURE 2.2. The Gains from Trade.
In the absence of trade, the United States produces and consumes at *A*, and the United Kingdom at *A'*. With trade, the United States specializes in the production of wheat and produces at *B*, while the United Kingdom specializes in the production of cloth and produces at *B'*. By exchanging 70W for 70C with the United Kingdom, the United States ends up consuming at *E* (and gains 20W and 10C), while the United Kingdom ends up consuming at *E'* (and gains 30W and 10C).
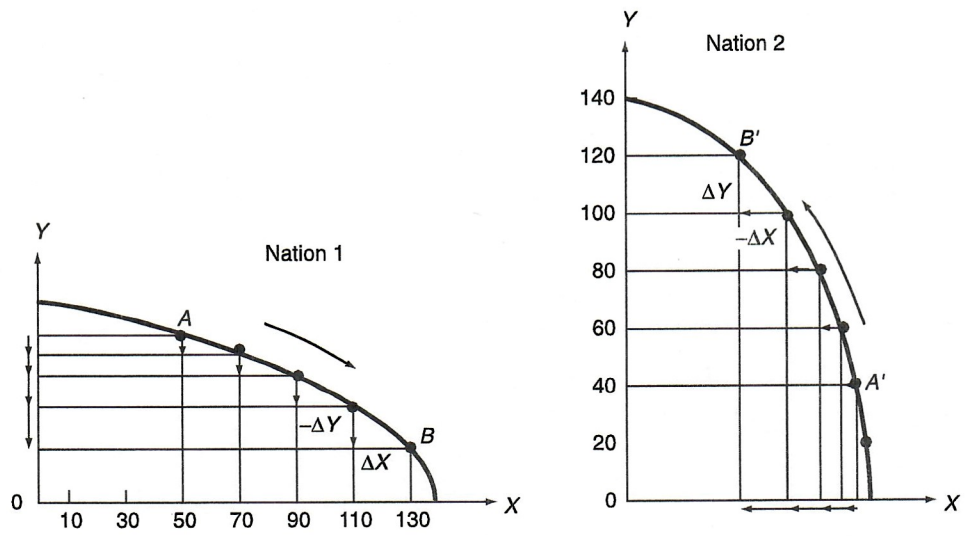
FIGURE 3.1. **Production Frontiers of Nation 1 and Nation 2 with Increasing Costs.**
Concave production frontiers reflect increasing opportunity costs in each nation in the production of *both* commodities. Thus, Nation 1 must give up more and more of Y for each additional batch of 20X that it produces. This is illustrated by downward arrows of increasing length. Similarly, Nation 2 incurs increasing opportunity costs in terms of forgone X (illustrated by the increasing length of the leftward arrows) for each additional batch of 20Y it produces.