

APPENDIX B

THE OFFER CURVE DIAGRAM

All the diagrams used to show free-trade equilibrium and the pattern of trade have illustrated directly how quantities demanded and supplied respond to relative prices. An alternative diagrammatic apparatus, in use in the literature on international trade for more than a century,⁴ 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 3.A.1 illustrates the *offer curves* for the two countries.

Since 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 OA . 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 OF units of clothing, which have an equivalent value. Should the relative price of food fall to the level shown by ray OB , 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

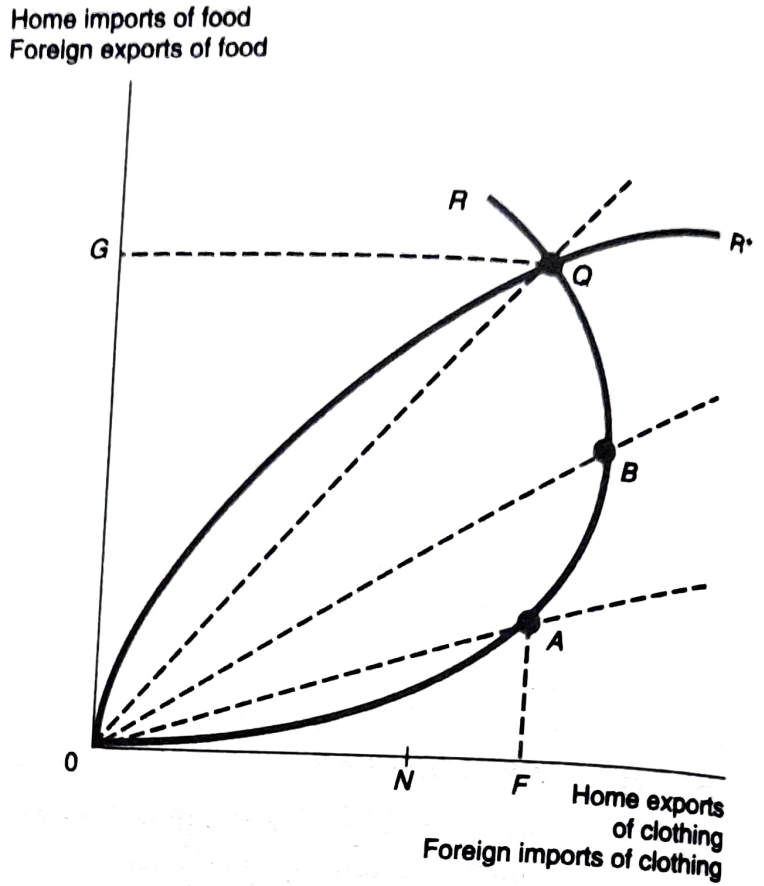
²In the parlance of Chapter 7, this follows if isoquants are strictly bowed in to the origin.

³It also follows that if production exhibits slightly increasing returns, the production possibilities schedule would still be bowed out (except near the axes).

⁴Offer curves, or reciprocal demand and supply curves, were used extensively by Alfred Marshall in his *Pure Theory of Foreign Trade*, London School of Economics and Political Science, 1930, first published in 1879.

Figure 3.A.1
Offer Curves

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



spent on a product when its price falls indicates an elastic demand.⁵ By contrast, a further reduction in food's relative price to the ray *OQ* 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 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, *OR**, 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 *OR**. Equilibrium is attained at a price ratio (shown by ray *OQ*) 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.

⁵The 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 OF/ON , which is greater than unity.

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.

Samuelson, Paul A. "The Transfer Problem and Transport Costs: The Terms of Trade When Impediments Are Absent," *Economic Journal*, 62 (June 1952): 278-304. A thorough analysis of classical transfer theory.

APPENDIX

THE STABILITY ISSUE

Chapter 4 illustrated world market equilibrium in Figures 4.1 and 4.4. 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 4.1's illustration of a stable free-trade equilibrium is Figure 4.A.1's depiction of *multiple* free-trade equilibria. Point C in Figure 4.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.)

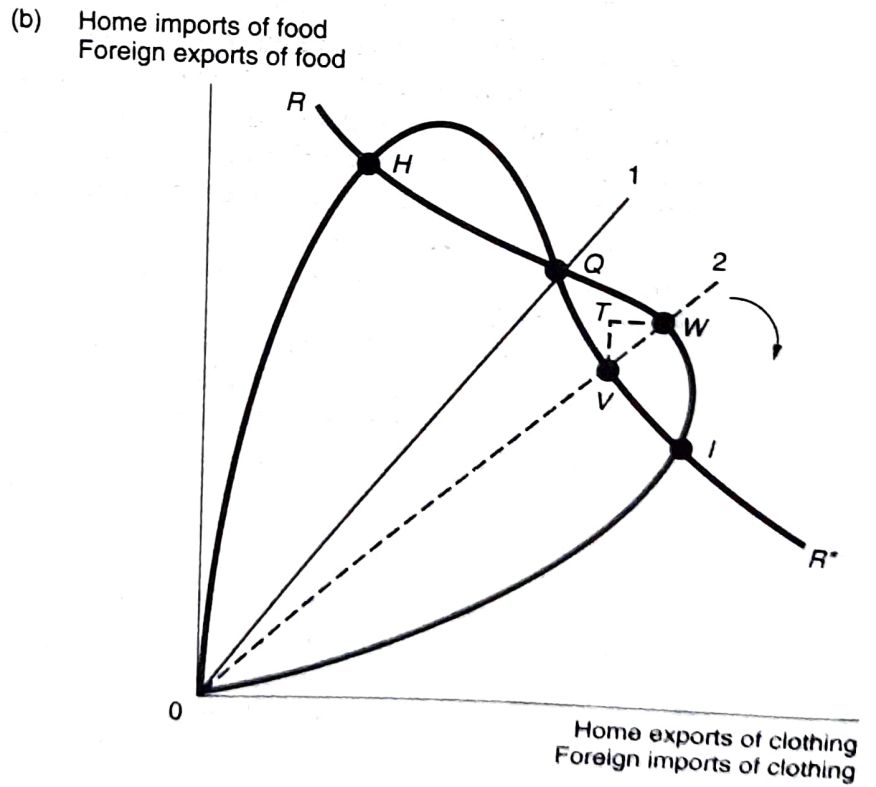
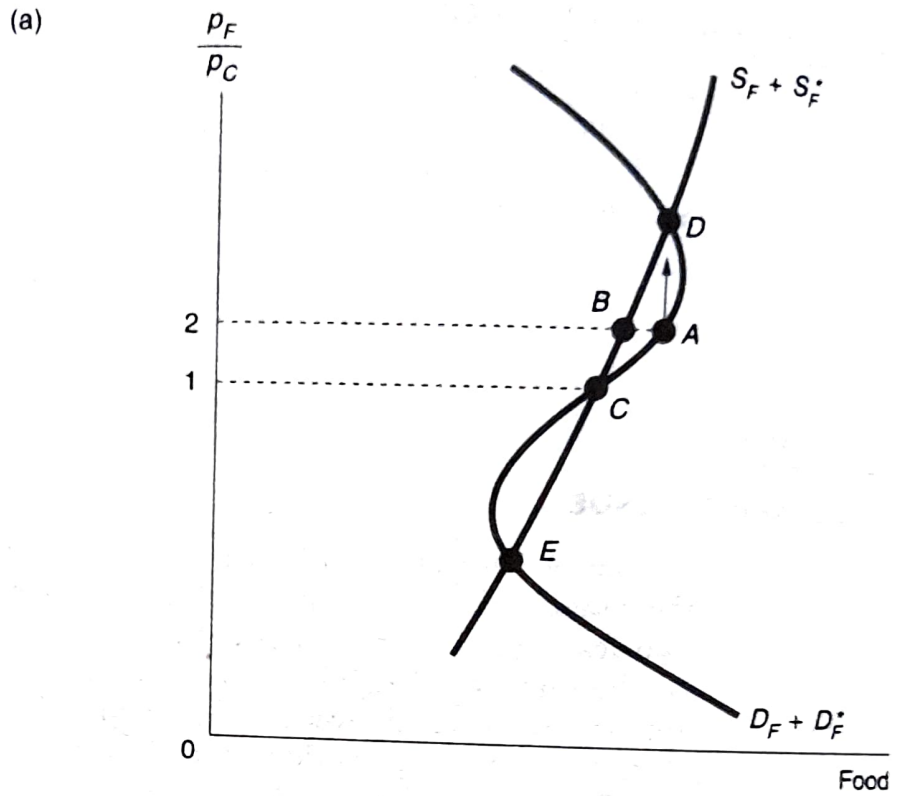
Figure 4.A.1(b) illustrates this instability in an offer curve diagram. At disequilibrium terms of trade 2, TV indicates the excess of the home country's import demand for food (given by point W along home offer curve OIWQHR) over foreign export supplies (given by point V along foreign offer curve OHQVIR*). Food's price will rise, rotating price line 2 clockwise toward stable intersection point I and away from unstable point Q. Point Q in 4.A.1(b) corresponds to point C in 4.A.1(a).

Each diagram helps to 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.⁶ 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.

⁶As the supplement to Chapter 4 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*.

Figure 4.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.



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, importers 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 will tend to run away from such equilibria. The applications of the basic trade model considered in Chapter 4 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 4 probes more deeply into the analytics of this issue.