

GAINS FROM TRADE IN NEOCLASSICAL THEORY

LEARNING OBJECTIVES

- LO1 Describe economic equilibrium in a country that has no trade.
- LO2 Discover the welfare-enhancing impact of opening a country to international trade.
- LO3 Demonstrate that either supply differences or demand differences between countries are sufficient to generate a basis for trade.
- LO4 Discuss the implications of key assumptions in the neoclassical trade model.

INTRODUCTION

The Effects of Restrictions on U.S. Trade

In 1999, economist Howard J. Wall of the Federal Reserve Bank of St. Louis investigated the extent to which trade barriers restricted U.S. trade and the size of the welfare costs of U.S. interferences with free trade.¹ He focused his attention on U.S. trade with countries other than Mexico and Canada since the United States had been removing barriers to trade with those countries due to the start of the North American Free Trade Agreement (NAFTA) in 1994. Wall indicated that the United States imported \$723.2 billion of goods from non-NAFTA countries in 1996, but it would have had imports that were \$111.6 billion greater than that if there had been no U.S. import restrictions. Hence, U.S. imports would have been 15.4 percent larger ($\$111.6 \text{ billion} \div \$723.2 \text{ billion} = 15.4\%$) but for the restrictions. He also calculated that U.S. exports to non-NAFTA countries, which were \$498.8 billion in 1996, would have been \$130.4 billion or more than 26 percent larger ($\$130.4 \text{ billion} \div \$498.8 \text{ billion} = 26.1\%$) if foreign countries had not had barriers to U.S. exports. Hence, interferences with free trade substantially reduce the amount of U.S. trade. Wall then calculated that the reduction in U.S. imports imposed a welfare cost on the United States of \$97.3 billion in 1996 (equivalent to \$139.9 billion in 2011), which was 1.4 percent of U.S. gross domestic product at the time. Although he was unable to estimate the welfare cost of the restrictions on U.S. exports, it is nevertheless clear that sizable welfare losses in general can occur because of interferences with free trade.

In this chapter we use the microeconomic tools developed in Chapter 5 to present the basic case for participating in trade and thus for avoiding these welfare costs of trade restrictions. This case is essentially an updating of the Ricardian analysis to include increasing opportunity costs, factors of production besides labor, and explicit demand considerations. We first describe the autarky position of any given country in the neoclassical theoretical framework, then explain why it is advantageous for the country to move from autarky to trade, and finally discuss qualifications that can be made to the analysis. Comprehending the nature of the gains from trade in this more general framework should provide an intuitive understanding of the welfare costs that result from the imposition of trade restrictions.

AUTARKY EQUILIBRIUM

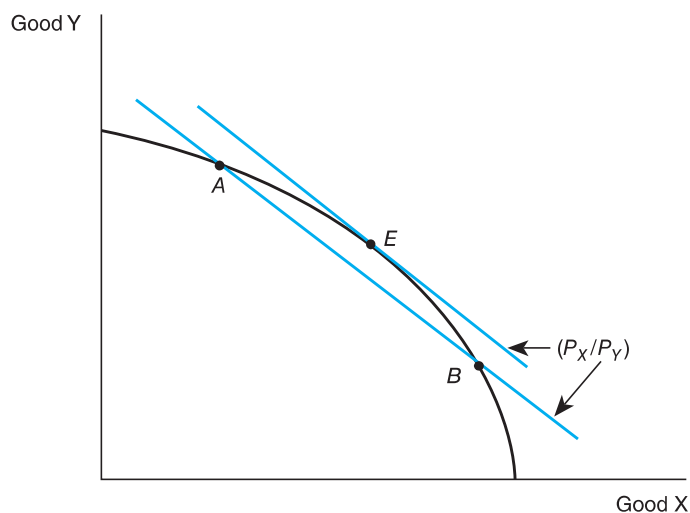
To the economist, *autarky* means total absence of participation in international trade. In this situation—as well as one with trade—the economy is assumed to be seeking to maximize its well-being through the behavior of its economic agents. Crucial assumptions made throughout this chapter include the following: (1) Consumers seek to maximize satisfaction, (2) suppliers of factor services and firms seek to maximize their return from productive activity, (3) there is mobility of factors within the country but not internationally, (4) there are no transportation costs or policy barriers to trade, and (5) perfect competition exists.

In autarky, as in trade, production takes place on the production-possibilities frontier (PPF). The particular point at which producers operate on the PPF is chosen by considering their costs of inputs relative to the prices of goods they could produce. Producer equilibrium on the PPF is illustrated in Figure 1. The equilibrium is at point *E*, where the PPF is tangent to the price line for the two goods.

Why is point *E* the equilibrium point? You will remember from Chapter 5 that the (negative of the) slope of the budget line or relative price line for goods *X* and *Y* is P_X/P_Y .

¹Howard J. Wall, “Using the Gravity Model to Estimate the Costs of Protection,” Federal Reserve Bank of St. Louis *Review*, January/February 1999, pp. 33–40.

FIGURE 1 Producer Equilibrium in Autarky



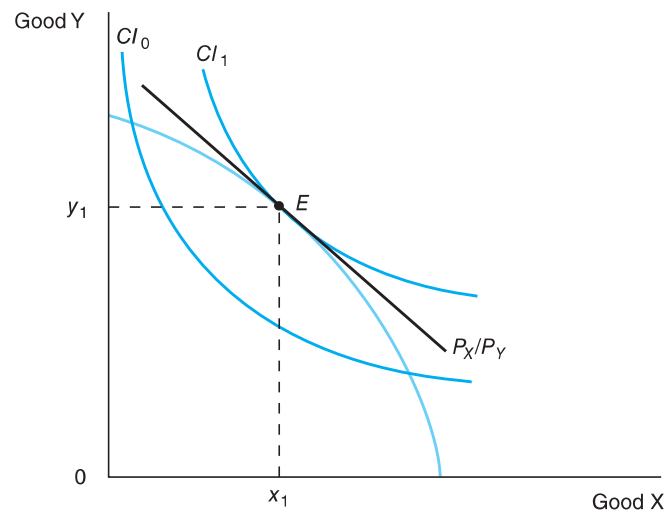
Production equilibrium in autarky is at point E , where the domestic price line is tangent to the PPF. At point E , $P_X/P_Y = MC_X/MC_Y$ and there is thus no incentive for producers to alter production. At point A , however, $P_X/P_Y > MC_X/MC_Y$, and at point B , $P_X/P_Y < MC_X/MC_Y$, indicating that greater profits can be obtained in both instances by moving to point E .

It was also pointed out that the (negative of the) slope of the PPF is the marginal rate of transformation (MRT) of the goods, which in turn is equal to the ratio of the marginal costs of production in the two industries, MC_X/MC_Y . Thus, in production equilibrium on the PPF, $P_X/P_Y = MRT = MC_X/MC_Y$. Alternatively, $(P_X/MC_X) = (P_Y/MC_Y)$, which indicates that, at point E , producers have no incentive to change production because the price received in the market for each good relative to the marginal cost of producing that good is the same. Only if these price/cost ratios were different would there be an incentive to switch production. (Remember also that with perfect competition, price equals marginal cost in equilibrium.)

Suppose that the economy is not at point E , but at point A (again, see Figure 1). Would this be an equilibrium point for the economy? Clearly not. At point A , because the given price line is steeper than the PPF, $(P_X/P_Y) > (MC_X/MC_Y)$ or, restating, $(P_X/MC_X) > (P_Y/MC_Y)$. Hence, point A cannot be an equilibrium production position for the economy because the price of good X relative to its marginal cost exceeds the price of good Y relative to its marginal cost. Producers have an incentive to produce *more* X and *less* Y because X production is relatively more profitable at the margin than Y production. As resources consequently move from Y to X , the economy slides down the PPF toward point E , and it will continue to move toward more X production and less Y production until point E is attained. As the movement from A to E takes place, the expanded X production raises MC_X and the reduced Y production lowers MC_Y . Therefore, the ratio (P_X/MC_X) is falling and the ratio (P_Y/MC_Y) is rising; because (P_X/MC_X) was originally greater than (P_Y/MC_Y) —at point A —this means that the two ratios are converging toward each other. They will continue to converge until point E is reached, where $(P_X/MC_X) = (P_Y/MC_Y)$. Movement to E would also occur from point B , where $P_X/P_Y < MC_X/MC_Y$.

Next, consumers are brought into the picture and the economy is portrayed in autarky equilibrium at point E in Figure 2. The attainment of this point is the result of the country attempting to reach its highest possible level of well-being, given the production constraint

FIGURE 2 General Equilibrium in Autarky



The autarky equilibrium for a country, taking account of both supply and demand, is at point E . At that point, the country is on the highest community indifference curve possible, given production constraints described by the PPF. Neither producers nor consumers can improve their situation, because, at point E , $MU_X/MU_Y = P_X/P_Y = MC_X/MC_Y$.

of the PPF. Note that the resulting price line is tangent not only to the PPF but also to the (community) indifference curve CI_1 . The tangency between an indifference curve and the price line reflects the fact that the relative price ratio (P_X/P_Y) is equal to the ratio of marginal utilities (MU_X/MU_Y), which in turn is defined as the marginal rate of substitution (MRS). Thus, in **autarky equilibrium** for the economy as a whole,

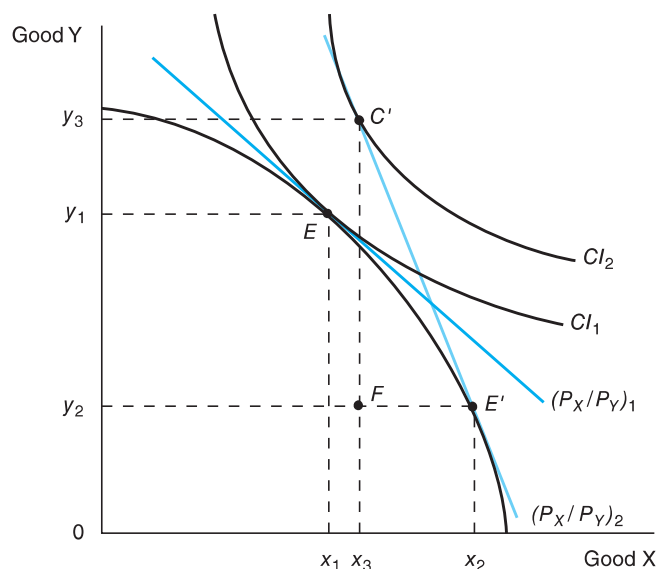
$$MRT = MC_X/MC_Y = P_X/P_Y = MU_X/MU_Y = MRS$$

With equilibrium at point E and given prices (P_X/P_Y), production of good X is $0x_1$ and production of good Y is $0y_1$. Note that equilibrium consumption under autarky is also $0x_1$ of good X and $0y_1$ of good Y . Without trade, production of each good in a country must equal the consumption of that good because none of the good is exported or imported. If the good were exported, then home production of the good would exceed home consumption because some of the production is being sent out of the country. If the good were imported, then home consumption would exceed home production because some of the consumption demand is met from production in other countries.

INTRODUCTION OF INTERNATIONAL TRADE

Suppose international trade opportunities are introduced into this autarkic situation. The most important feature to keep in mind is that the opening of a country to international trade means *exposing the country to a new set of relative prices*. When these different prices are available, the home country's producers and consumers will adjust to them by reallocating their production and consumption patterns. This reallocation leads to gains from trade. *The ultimate source of gain from international trade is the difference in relative prices in autarky between countries.*

FIGURE 3 Single (Home) Country Gains from Trade



In autarky, the home country is in equilibrium at point E . With the opening of trade, it now faces the international terms of trade, $(P_X/P_Y)_2$. Given the relatively higher international price of the X good, production moves to E' , the point of tangency between the international terms of trade and the PPF. At the same time, the Y good is relatively less expensive at international prices, so consumers increase their relative consumption of it and begin consuming at point C' , where the terms of trade are tangent to the highest community indifference curve attainable. C' lies outside the PPF and is obtained by exporting the amount $x_3 - x_2$ of the X good and exchanging it for $y_2 - y_3$ imports of the Y good. The country is clearly better off because trade permits it to consume on the higher indifference curve CI_2 .

The reallocation of production and consumption and the gains from trade are illustrated in Figure 3. (This figure will be used extensively in this book, so it is important to understand it now.) Under autarky the optimal point for the economy is at E , producing and consuming $0x_1$ of the X good and $0y_1$ of the Y good. The welfare level is indicated by indifference curve CI_1 , and prices in autarky are $(P_X/P_Y)_1$. Suppose that the country now faces international prices of $(P_X/P_Y)_2$. This new set of prices is steeper than the prices in autarky, reflecting the assumption that relative prices in the home market are lower for X and higher for Y than in the international market. Thus, the home country has a *comparative advantage in good X* and a *comparative disadvantage in good Y*. The difference between relative prices in the home country and the set of international prices indicates that the home country is relatively more efficient in producing X and relatively less efficient in producing Y.

With producers now facing a relatively higher price of X in the world market than in autarky, they will want to shift production toward X and away from Y because they anticipate greater profitability in X production. Thus, production will move from point E to point E' . The stimulus for increasing X production and decreasing Y production is that the new relative price ratio $(P_X/P_Y)_2$ exceeds the ratio MC_X/MC_Y at E and will continue to exceed MC_X/MC_Y until equality between relative prices and relative marginal costs is restored at point E' . At E' , production of good X has risen from $0x_1$ to $0x_2$, and production of good Y has fallen from $0y_1$ to $0y_2$.

Thus, production in the home country will move to point E' . What about the country's consumption? In tracing consumption geometrically, the key point is that the relative price line tangent at E' is also the country's **trading line**, or consumption-possibilities frontier. With production at E' , the country can exchange units of good X for units of good Y at the new prevailing prices, $(P_X/P_Y)_2$. Thus, the country can settle anywhere on this line by exchanging some of its X production for good Y in the world market. Consumer theory tells us that consumers will choose a consumption point where an indifference curve is tangent to the relevant price line. *With trade*, this point is C' in Figure 3. The well-being of the country's consumers is maximized at C' , and the consumption quantities are $0x_3$ of good X and $0y_3$ of good Y. Thus, with trade and the new relative prices, production and consumption adjust until $MRT = MC_X/MC_Y = (P_X/P_Y)_2 = MU_X/MU_Y = MRS$.

Note that point C' is beyond the PPF. Like the Classical model discussed in Chapter 3, international trade permits consumers to consume a bundle that lies beyond the production capabilities of their own country. Without trade, consumption possibilities were confined to the PPF, and the PPF was also the CPF (consumption-possibilities frontier). With trade, the CPF differs from the PPF and permits consumption combinations that simply cannot be reached by domestic production alone. The CPF is represented by the given international price line, since the home country could choose to settle at any point along this line. Access to the new CPF can benefit the country because consumption possibilities can be attained that previously were not possible. The gains from trade in Figure 3 are reflected in the fact that the new CPF allows the country to reach a higher community indifference curve, CI_2 .

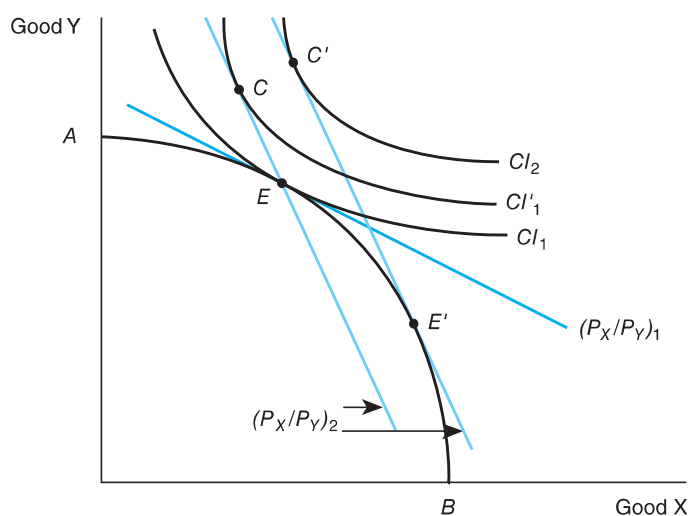
Trade has thus enabled the country to attain a higher level of welfare than was possible under autarky. The trade itself also is evident in Figure 3. Because production of good X is $0x_2$ and consumption of good X is $0x_3$, the difference between these two quantities— x_3x_2 —represents the *exports* of good X by this country. Similarly, because $0y_2$ is production of good Y and $0y_3$ is consumption of good Y, the difference between these two quantities— y_2y_3 —measures the *imports* of good Y by the country. Further, the trade pattern is summarized conveniently in **trade triangle $FC'E'$** . This triangle for the home country has the following economic interpretation: (a) The base of this right triangle (distance FE') represents the exports of the country, because $FE' = x_3x_2$; (b) the height or vertical side of the triangle (distance FC') represents the imports of the country, because $FC' = y_2y_3$; and (c) the hypotenuse $C'E'$ of the triangle represents the trading line, and (the negative of) its slope indicates the world price ratio or terms of trade.

The Consumption and Production Gains from Trade

As discussed, the home country has gained from trade. Economists sometimes divide the total gains from trade into two conceptually distinct parts—the **consumption gain** (or **gains from exchange**) and the **production gain** (or **gains from specialization**).

The consumption gain from trade refers to the fact that the exposure to new relative prices, *even without changes in production*, enhances the welfare of the country. This gain can be seen in Figure 4, where points E , E' , and C' are analogous to E , E' , and C' in Figure 3, as are the autarky prices $(P_X/P_Y)_1$ and the trading prices $(P_X/P_Y)_2$. When the country has no international trade, it is located at point E . Now suppose that the country is introduced to the trading prices $(P_X/P_Y)_2$ but that, for the moment, production does not change from point E . A line representing the new price ratio is then drawn through point E ; production remains at E , and the new, steep price line with slope $(P_X/P_Y)_2$ is the trading line. With this trading line, consumers can do better than at point E , so they move to a tangency between the new prices and an indifference curve. If consumers remained at E , the price of good X divided by the price of good Y would be greater than the marginal utility of good X divided by the marginal utility of good Y. In other words, the marginal utility of good Y

FIGURE 4 Gains from Exchange and Specialization with Trade

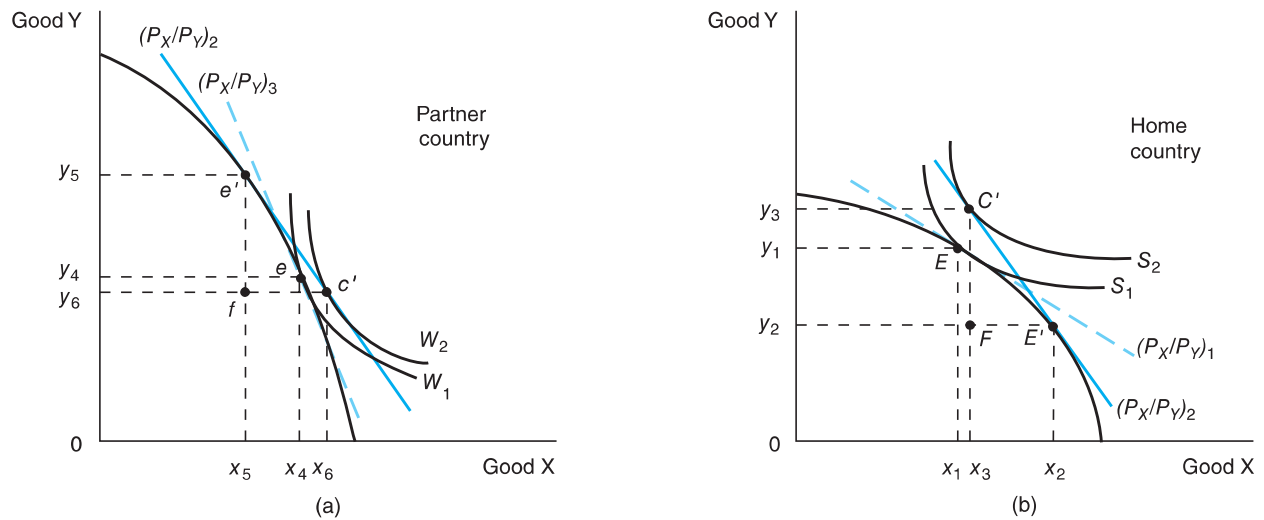


In autarky, domestic consumption and production take place at point E . With the opening of trade but without any change in domestic production, consumers can consume along the international terms-of-trade line, $(P_X/P_Y)_2$, passing through point E . Because the relative price of good Y is lower internationally, consumers will begin to consume more Y and less X , choosing point C . The increase in well-being represented by the difference between CI_1 and CI'_1 is referred to as the consumption gain or “gains from exchange.” Given enough time to adjust production, domestic producers will begin producing more of the relatively more valuable good X and less of good Y , maximizing profits at point E' . The increase in welfare brought about through the specialization in good X allows consumers to reach CI_2 and C' . The increase in well-being represented by the movement from C to C' (CI'_1 to CI_2) is referred to as the production gain or “gains from specialization.”

per dollar spent on Y would exceed the marginal utility of good X per dollar spent on X . The consumers would hence change their consumption bundle toward consuming more of good Y and less of good X . Maximizing welfare with this production constraint thus places consumers at point C . Because point C is on a community indifference curve (CI'_1) that is higher than the community indifference curve (CI_1) in autarky, the country has gained from trade even though production has not changed. The gain reflects the fact that, with new prices, consumers are switching to greater consumption of import good Y , now priced lower, and away from export good X , now priced higher. Thus, even if a country has an absolutely rigid production structure where no factors of production could move between industries, there are still gains from trade.

A further welfare gain occurs because production changes rather than remains fixed at E in Figure 4. With the new relative prices, there is an incentive to produce more of good X and less of good Y since X is now relatively more profitable to produce than is Y , and the production switch from E to E' is in accordance with comparative advantage. Moving production toward the comparative-advantage good thus increases welfare, permitting consumers to move from point C to point C' . In sum, the **total gains from trade** attained by moving from point E to point C' (and correspondingly from CI_1 to CI_2) can be divided conceptually into two parts: (1) the consumption gain, involving movement from point E to point C (and correspondingly from CI_1 to CI'_1), and (2) the production gain, involving movement from point C to point C' (and correspondingly from CI'_1 to CI_2).

FIGURE 5 Partner-Country Gains from Trade



As indicated in panel (a), in autarky the partner country produces and consumes at point e . With trade it now faces the international price ratio $(P_X/P_Y)_2$, which is flatter than its internal relative prices in autarky. Consequently, production of the relatively more expensive good Y expands and production of good X contracts, until further adjustment is no longer profitable at point e' . Consumers now find good X relatively less expensive and adjust their consumption expenditures by moving from point e to point c' . The opening of trade allows the country to consume outside the PPF on the higher indifference curve W_2 , thus demonstrating the gains from trade (the difference between W_1 and W_2). Note that, with trade, both countries face the same set of relative product prices, $(P_X/P_Y)_2$.

Trade in the Partner Country

If we assume a two-country world, the analysis for the trading partner is analogous to that employed for the home country, although the trade pattern is reversed. Figure 5(a) is the basic graph. The discussion of it can be brief because no new principles are involved. For purposes of contrast, panel (b) illustrates the home country situation discussed earlier.

In Figure 5(a), the trading partner's equilibrium in autarky is at point e , where the country faces autarky prices $(P_X/P_Y)_3$. The partner is producing quantity $0x_4$ of good X and quantity $0y_4$ of good Y, and the welfare level for the country is indicated by indifference curve W_1 . With international trade, international relative prices $(P_X/P_Y)_2$ will be *less* than autarky prices $(P_X/P_Y)_3$. (The exact determination of trading prices will be explored in considerably more detail in Chapter 7.) Thus, this partner country has a comparative advantage in good Y and a comparative disadvantage in good X.

Because of the new relative prices available through international trade, producers in the partner country have an incentive to produce more of good Y and less of the X good. The production point moves from e to e' , where there is a tangency of the PPF with $(P_X/P_Y)_2$ and where production of good X is $0x_5$ and production of good Y is $0y_5$. From point e' , the country can move along the trading line until consumers are in equilibrium, represented by a point of tangency of the price line $(P_X/P_Y)_2$ to an indifference curve. The consumption equilibrium is point c' with trade, and consumption is $0x_6$ of good X and $0y_6$ of good Y.

As in the case of the home country, the difference between production and consumption of any good reflects the volume and pattern of trade. Because production of good X is $0x_5$ and consumption of good X is $0x_6$, the country *imports* x_5x_6 of good X. Because production of good Y is $0y_5$ and consumption of good Y is $0y_6$, the country thus *exports* y_6y_5 of good Y. Trade triangle $fe'c'$ represents the same phenomenon as earlier, but in this case horizontal side fc' indicates imports and vertical side fe' represents exports. Note that in a two-country

world, the partner-country trade triangle $fe'c'$ is congruent to home country trade triangle $FC'E'$. This must be so because, by definition, the exports of the home country are the imports of the partner country, and the imports of the home country are the exports of the partner country. In addition, the trading prices $(P_X/P_Y)_2$ are the same for each country.

It is obvious that the partner country also gains from trade. With trade, the country's consumers are able to reach indifference curve W_2 , whereas in autarky the consumers could reach only lower indifference curve W_1 . The "gains from trade" for this country could also be split into the "production gain" and the "consumption gain" as was done for the home country, but this is an exercise left for the reader.

CONCEPT CHECK

1. What is necessary for a country to gain from trade in neoclassical theory? How does one know if a country has gained from trade?
 2. Explain the difference between the "gains from exchange" (consumption gain), the "gains from specialization" (production gain), and the "total gains from trade."
 3. What is meant by the trade triangle? Why must the trade triangles of the partner and the home country be congruent in a two-country analysis?
 4. Within what range must the international terms of trade lie?
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MINIMUM CONDITIONS FOR TRADE

The discussion in the previous section demonstrated that there is a basis for trade whenever the relative prices of goods in autarky of the two potential trading partners are different. It is important to address briefly conditions under which this could come about. If the generation of relative price differences in autarky seems highly unlikely, then the total potential gains from trade would be limited and trade theory largely irrelevant. On the other hand, if there seems to be a considerably broad set of circumstances that could generate relative price differences, there would be a strong underlying basis for believing that potential gains from trade are present.

Theoretically, there are two principal sources of relative price variation between two countries: differences in supply conditions and differences in demand conditions. To establish *minimum* conditions for generating relative price differences in autarky, we look first at the role of demand, assuming identical production conditions. Second, we address the role of supply under identical demand conditions.

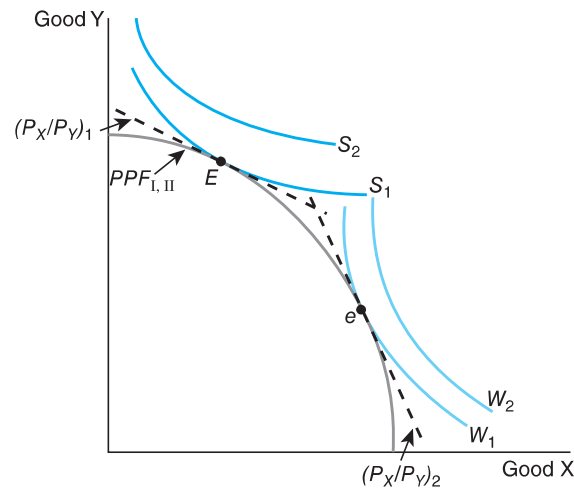
Trade between Countries with Identical PPFs

This case could not possibly have been handled in the Classical analysis. In Ricardian analysis, if the production conditions were the same for the trading partners in all commodities (i.e., identical PPFs), then the pretrade price ratios in the two countries would be the same; there would be no incentive for trade and of course no gains from trade.

According to neoclassical theory, two countries with identical production conditions *can* benefit from trade. Different demand conditions in the two countries in the presence of increasing opportunity costs characterize this situation. Increasing opportunity costs are critical for the result, but the recognition of how different demand conditions influence trade is also necessary to update the Classical analysis.

Figure 6 illustrates this special case. The two countries have identical production conditions, so we need to draw only one PPF because it can represent either country. The different tastes in the two countries are shown by different indifference maps. Suppose that country I has a relatively strong preference for good Y; this preference is indicated by curves S_1 and S_2 , which are positioned close to the Y axis. On the other hand, country II has a relative

FIGURE 6 The Basis for Trade between Two Countries with Identical PPFs and Different Demand Conditions



With identical production conditions in country I and country II, the same PPF ($PPF_{I,II}$) exists for both. If demand conditions differ between the two countries, then their respective community indifference maps are different. If this is the case, points of tangency between the two different community indifference curves and the common PPF will occur at different points on the PPF (i.e., E and e) and hence reflect different sets of relative prices in autarky. There is thus a basis for trade.

preference for the X good, so its curves W_1 and W_2 are positioned close to the X axis. The autarky equilibrium points are point E for country I and point e for country II. Given these autarky positions, it is evident that the autarky price ratio in country I is $(P_X/P_Y)_1$ and that the autarky price ratio in country II is $(P_X/P_Y)_2$.

Because $(P_X/P_Y)_1$ is less than $(P_X/P_Y)_2$, country I has the comparative advantage in good X, and country II has the comparative advantage in good Y. The price ratios show that the preference for good Y in country I has bid up P_Y relative to P_X and that the preference for good X in country II has bid up P_X relative to P_Y . With the opening of trade between the two countries, country I will export X and expand the production of X in order to do so and it will decrease production of good Y as good Y is now imported. Similarly, country II will have an incentive to expand production of and to export good Y and an incentive to contract production of and to import good X. The countries will trade at a price ratio (not shown) somewhere between the autarky price ratios, a price ratio that is tangent to the identical PPFs at a point between E and e . Both countries will be able to attain higher indifference curves. The common sense of the mutual gain from trade is that each country is now able to consume more of the good for which it has the greater relative preference. Thus, trade between identical economies with different demand patterns can be a source of gain and can be interpreted easily by neoclassical trade theory, while the Classical model cannot explain why trade would take place because, with identical constant-opportunity-cost PPFs, relative prices in the two countries would not differ.

Trade between Countries with Identical Demand Conditions

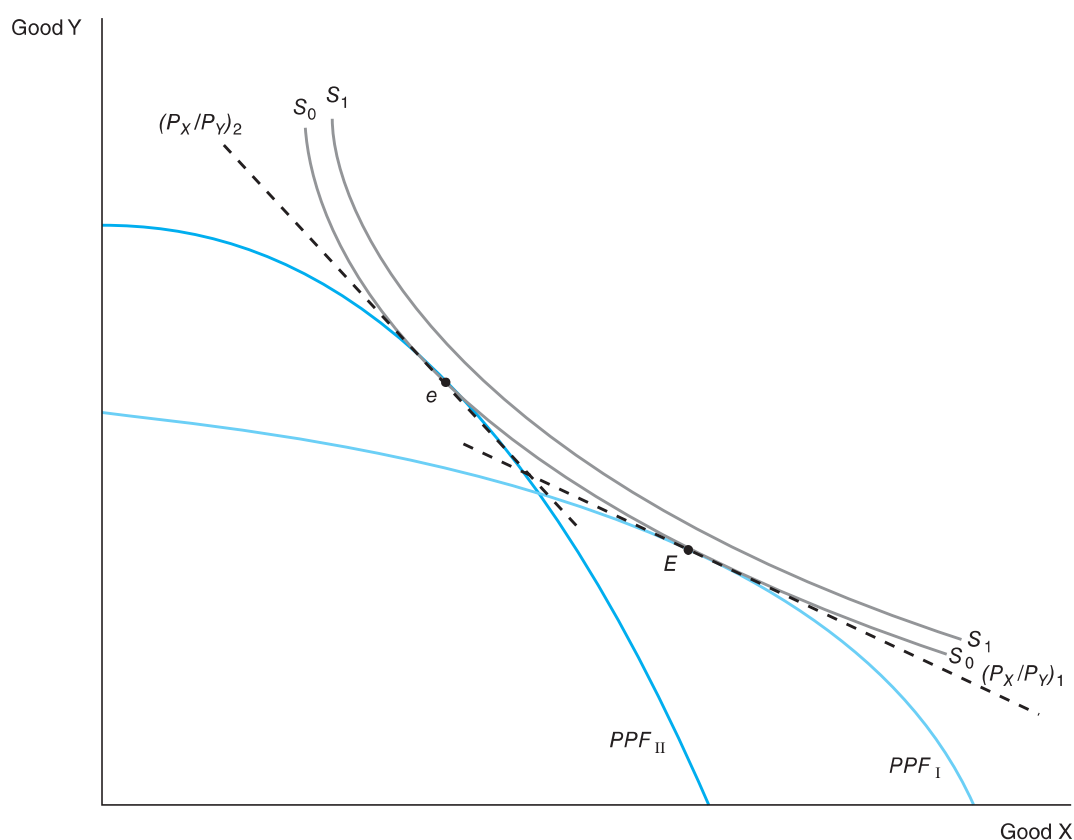
We now turn to the situation in which two countries have the same demand conditions but different production conditions. Production conditions may differ because different technologies are employed in two countries with the same relative amounts of the two factors, capital and labor, because similar technologies exist in both countries but the relative

availability of factors differs, or because the two countries have a combination of different technologies and different relative factor availabilities.

Let us assume for the present discussion that production conditions differ between the two countries because the technologies are different. Each country is employing a different technology, so there will be different production possibilities and different PPFs (see Figure 7). Assuming that the relative amounts of factors are similar between the two countries, PPF_I demonstrates a technology that is relatively more efficient in the production of good X, and PPF_{II} a technology that is relatively more efficient in the production of good Y.

With demand conditions assumed to be identical in both countries, an identical community indifference map can be used to represent tastes and preferences. The existence of different production conditions is sufficient to produce different domestic price ratios in autarky, even in the presence of identical demand conditions. Country I, which is relatively more efficient in producing good X, will find itself producing and consuming relatively more of this product in autarky, for example, at point E . Similarly, country II, which has the technological advantage in good Y, will find itself producing and consuming more

FIGURE 7 The Basis for Trade between Two Countries with Identical Demands and Different Production Structures



Different production structures based on the existence of different country technologies (but with similar resource availabilities) are demonstrated in the two differently shaped PPFs. Country I has a technical advantage in the production of good X and country II has a technical advantage in production of good Y. Given identical demand structures (i.e., a common community indifference map), the tangencies between the PPFs and the highest indifference curve will occur at different points E and e . Because the slopes at those points are different, the relative prices in autarky are different. With international terms of trade somewhere between the two sets of autarky prices, both countries can gain by trading.

of good Y in equilibrium (point e). As relative prices are different in autarky, there is a basis for trade because $(P_X/P_Y)_I < (P_X/P_Y)_{II}$. Country I will export good X and import good Y at terms of trade (not shown) that are between the two autarky price ratios, and it will increase production of good X and decrease production of good Y. Country II will do the reverse—it will expand production of and export good Y and will contract production of and import good X. Each country can then attain a higher indifference curve. We conclude that a second possible minimal condition for gains from international trade is a difference in supply conditions, even with identical demand in the two countries.

Conclusions

We have seen that relative prices in autarky reflect underlying supply and demand conditions, thus depending jointly on the relative amounts and quality of available resources, the characteristics of the production technologies employed, and the nature of demand in a country. Different relative prices can therefore exist between countries as long as *one or more* of these factors are different. Such a minimal condition suggests that the likelihood of a basis for trade between the many countries of the world is great. It also makes it clear that the underlying basis for trade can change as technology changes, as factors grow within countries, as factors move between countries, and as individual country demand patterns change in response to economic development and/or the increased exposure to different products and cultures.

SOME IMPORTANT ASSUMPTIONS IN THE ANALYSIS

This section briefly discusses three important assumptions used in the previous analysis that may need to be taken into account when examining the “real world.” The intent is to introduce an element of caution rather than doubt concerning neoclassical theory. Indeed, few principles are so universally accepted by economists as comparative advantage and the gains from international trade.

Costless Factor Mobility

One important assumption is that factors of production can shift readily and without cost along the PPF as relative prices change and trade opportunities present themselves. In practice, however, it may not be possible to adjust immediately to the changed relative prices. Movement from the autarky production point to the trade production point may first involve a movement *inside* the PPF as workers and equipment are no longer used in the import-competing industry but have yet to be fully absorbed in the export industry. Perhaps labor must be retrained, factors must be moved from one section of the country to another, or depreciation allowances for plant and equipment must accumulate before capital can be reinvested elsewhere. Only after time passes will the export industry be able to employ the unused factors and move the economy to the PPF. These kinds of mobility problems are assumed away in the theory presented earlier.

When factor movement does occur slowly or experiences an adjustment cost so that the production point does not slide easily along the PPF but moves inside it, many economists argue that some type of government assistance is required. Many countries have set up such assistance programs. For example, beginning in 1962 and continuing to the present, the United States has had a program of **trade adjustment assistance** in place (although the nature and funding of the program have varied over the years) to help in the transition following tariff reductions through trade negotiations. (The program of such assistance in the United States is discussed further in Chapter 16, “Political Economy and U.S. Trade Policy.”)

Full Employment of Factors of Production

This assumption is related to the problem of adjustment, but it merits separate treatment because of its application to a more general context. The assumption that all of a country’s factors of production are fully employed (or experience a given level of unemployment

owing to institutional characteristics, e.g., a “natural level of unemployment”), combined with their efficient use in the competitive market, means that the country is operating on the PPF. Thus, because of this assumption, we have not previously analyzed situations where trade moved the country from somewhere inside the PPF to a point on the PPF.

The “full-employment” assumption is a general one in microeconomic theory as well as in trade theory. In micro, it is assumed that the *macroeconomic* question of unemployment has been solved. The solution to the problem of unemployment might lie, for example, with effective monetary and fiscal policies. Given this solution, the subject of microeconomics looks at questions of efficiency and welfare.

Of course, realistically, countries do not always attain full employment, as has been evident in recent years. The full-employment assumption allows the analyst to focus on efficiency and welfare, as distinct from the problems of unemployment and idle capacity. Clearly, a country can have unemployment whether it is in autarky or is engaged in trade. However, it should be emphasized that even if a country has unemployment in autarky and is operating inside its PPF, trade permits it to move to a higher indifference curve. The opening of the country to trade will lead to different prices facing consumers and producers than was the case with autarky. Gains from exchange and specialization still occur.

The Indifference Curve Map Can Show Welfare Changes

In Chapter 5, the possibility that *community* indifference curves might intersect was raised. If intersections occur, there might be a problem in interpreting welfare changes when a country moves from autarky to trade. In this chapter, however, no intersecting community indifference curves have so far been drawn. It is useful to comment on this disparity.

A number of somewhat restrictive assumptions can be used to construct nonintersecting community indifference curves. These assumptions can guarantee that welfare changes can be interpreted as they have been in this chapter (see Tower, 1979). The explanation of the conditions necessary for concluding that welfare will improve when autarky gives way to trade is straightforward. Two general conditions are pertinent: (1) that individuals within the economy have reasonably similar tastes, and (2) that the opening of the economy to trade does not radically alter the distribution of income. The underlying rationale for these conditions is that, without them, our earlier analysis would suggest that community indifference curves could intersect. By assuming that redistribution is not large and that people have similar tastes, we thus minimize the possibility of not being able to tell whether actual welfare has changed.

However, even with these general conditions, we cannot be sure that the direction of the actual welfare change can be meaningfully ascertained, as the phrases “have reasonably similar tastes” and “radically alter the distribution of income” do not lend themselves to precise interpretation. Because of this uncertainty, advanced trade theory has gone well beyond the use of indifference curves to other modes of demonstrating the gains from trade. The **compensation principle** summarizes the general conclusion of these extensions. The advanced literature demonstrates that *potential* gains from trade exist in the sense that, within the country, the people who gain from trade can compensate the losers and still be better off. This must mean, therefore, that there is a larger “pie” to split up after trade has been introduced. If the compensation is paid, then society is better off because the gainers have benefited even after compensating the losers. Everyone is at least as well off as in autarky, and some people are better off. Thus, trade can yield higher welfare than autarky, but the reverse is never true. If the compensation is not actually paid, then society is described as being only “potentially” better off. It is potential because some people could be made better off and everyone else no worse off, but this would not happen without the transfer. Further consideration of this principle using our familiar community indifference curves is given in the appendix to this chapter.

IN THE REAL WORLD:

CHANGES IN INCOME DISTRIBUTION WITH INCREASED TRADE

The initiation of trade can influence the distribution of income by means of changes in both production and consumption conditions. With the opening of trade, the relative price of export goods increases and the relative price of import substitute goods decreases. On the supply side, this will lead to an expansion of production of export goods and a contraction of production of import-substitute goods. Consequently, there will be an increase in the demand for inputs used in export production and a reduction in demand for inputs used in the domestic production of the import good. In the adjustment process, the price of certain factors or inputs will likely increase and the price of others will likely decline, leading to a change in income distribution. Estimates of such supply-side impacts will be discussed in Chapters 8 and 9, which deal with production and income distribution in the context of the supply-oriented theory of the determination of comparative advantage known as the Heckscher-Ohlin theorem. However, a study by Spilimbergo, Londoño, and Székely (1999) examined 34 countries from 1965 to 1992 and suggested that, while relative factor endowments go a long way in explaining personal income distribution, distribution is also influenced by the degree of general openness of a country to international trade. The study concluded that reductions in trade barriers (becoming more “open”) decreased income inequality in capital-abundant countries but increased income inequality in skill-abundant countries. These provocative conclusions reinforce the notion that trade can influence income distribution, although the mechanisms are likely much more complicated than suggested by the simple Heckscher-Ohlin framework.

In another study, Andrew Berg and Anne Krueger (2002) hypothesized that trade liberalization can benefit the poorer segments of a country’s population at least as much as liberalization benefits the average person. This hypothesized

result occurs because, among other phenomena, greater openness of a country can reduce the power of domestic monopolies. In developing countries, greater openness can raise the wages of low-skilled workers as exports of low-skill-intensive goods increase. Further, increased exports of agricultural goods can augment incomes of the poor in the rural areas. Nevertheless, after surveying existing literature examining the relationship of openness and income distribution across many countries at a point in time, they concluded that no systematic relationship between the liberalization and the poor can be made. Studies of any given country over time might lead to more definite results, however.

In addition, distribution effects occur in consumption. Because the price of export goods is rising with trade and that of import goods is falling, individuals who spend relatively more of their income on export goods will find their real income relatively smaller compared to that of individuals who spend relatively more on import goods, other things being equal. To give an example of the magnitude of possible consumption-related income distribution effects, consider Susan Hickok’s (1985, p. 11) estimates of the impact of the higher domestic prices caused by U.S. import restrictions on automobiles, sugar, and clothing in 1984. The protection-induced increases in expenditure on these products were equivalent to an income tax surcharge of 66 percent for low-income earners (\$7,000–\$9,350 annually), 33 percent for those in the \$14,050–\$16,400 range, 20 percent for those earning \$23,400–\$28,050, and only 5 percent for individuals earning \$58,500 and above. Because these products absorb a higher percentage of individual expenditures of low-income earners than of high-income earners, increasing international trade by removing those tariff and quota barriers would clearly have had the effect that low-income groups would benefit relatively more than high-income groups. ●

CONCEPT CHECK

1. Briefly describe the minimum conditions for trade to take place between two countries, that is, for there to be a difference in their respective price ratios in autarky.
2. Why do different demand conditions influence the basis for trade in neoclassical theory but not in Classical theory?
3. How can opening a country to trade influence income distribution? How does this affect our ability to demonstrate the gains from trade?

SUMMARY

Neoclassical trade theory's demonstration of the gains from international trade uses the analytical tools of the production-possibilities frontier and the community indifference curve. In autarky, a country reaches its highest indifference curve when the marginal rate of transformation (MRT) in production equals the price ratio of goods, which in turn equals the marginal rate of substitution (MRS) in consumption. When the country is opened to international trade, it faces a new set of relative prices. The adjustment by producers and consumers to this new set of prices and the resulting trade enables the country to attain a higher indifference curve. Consideration of the minimal conditions necessary to produce different autarky prices showed that autarky price ratios can differ as long as there is a difference in either demand or supply conditions. For example, two countries with identical (increasing-opportunity-cost)

PPFs can both gain from trade if tastes differ between the countries. Or a basis for trade can exist if different technologies are employed by countries that are otherwise identical. The important role played by the relative availability of factors in influencing relative prices in autarky will be discussed in Chapter 8, "The Basis for Trade: Factor Endowments and the Heckscher-Ohlin Model."

The neoclassical theory of trade makes use of some special assumptions involving adjustment to change, full employment, and indifference curves. The implications of these assumptions were discussed briefly in this chapter. In addition, we frequently utilized an assumption that, when a country is opened to trade, the country takes the new set of world prices as *given*. Forces influencing the determination of the new price ratio will be covered in more detail in the next chapter.

KEY TERMS

autarky equilibrium	production gain (or gains from specialization)	trade triangle
compensation principle	total gains from trade	trading line
consumption gain (or gains from exchange)	trade adjustment assistance	

QUESTIONS AND PROBLEMS

1. Indicate the equilibrium production and consumption point in autarky, using a PPF and a community indifference curve under increasing-opportunity-cost conditions. Why is this an equilibrium? What must occur for this country to gain from trade?
2. Assume that a country produces and consumes two goods, cloth and machines, and is in equilibrium in autarky. It now finds that it can trade at international prices where $(P_{\text{cloth}}/P_{\text{machines}})$ on the world market is greater than $(P_{\text{cloth}}/P_{\text{machines}})$ in the domestic market. Should it trade? If so, what commodity should it export? Why? Will it gain from trade? How do you know?
3. Explain the difference between the "gains from exchange" (consumption gain) and the "gains from specialization" (production gain).
4. Suppose a country that is producing within its production-possibilities frontier in autarky experiences an 8 percent rate of unemployment. Is it possible for it to gain from trade if the rate of unemployment remains approximately the same?
5. "The inability of factors to move from one use to another in production will completely take away any possible gains from trade." Agree? Disagree? Explain.
6. What general conditions must hold for one to be able to use community indifference curves to represent consumer well-being in a country and demonstrate gains from international trade?
7. The United States has had an embargo on trade with Cuba for over 50 years, but pressure is increasing to relax it. Opponents of ending the embargo argue that opening trade between the United States and Cuba would benefit Cuba and hurt the United States by injuring U.S. producers of goods that compete with potential Cuban exports. Evaluate this position utilizing what you have learned in this chapter.
8. If the production conditions in the United States and Japan were to become essentially the same, would the neoclassical model suggest that trade between the two countries would cease? Why or why not?
9. Ms. Jones, one of your neighbors, spends the majority of her income on food. She complains to you that, after your country became more open to trade and began exporting a variety of food products, her real income was reduced. She therefore maintains that the country has obviously been hurt by the new, expanded trade and that trade restrictions should be imposed. How would you respond to Ms. Jones?
10. (Requires appendix material) "If trade should cause income distribution to change such that there was a shift in the indifference map, it would be impossible to reach a conclusion regarding any possible gains from international trade." Discuss.