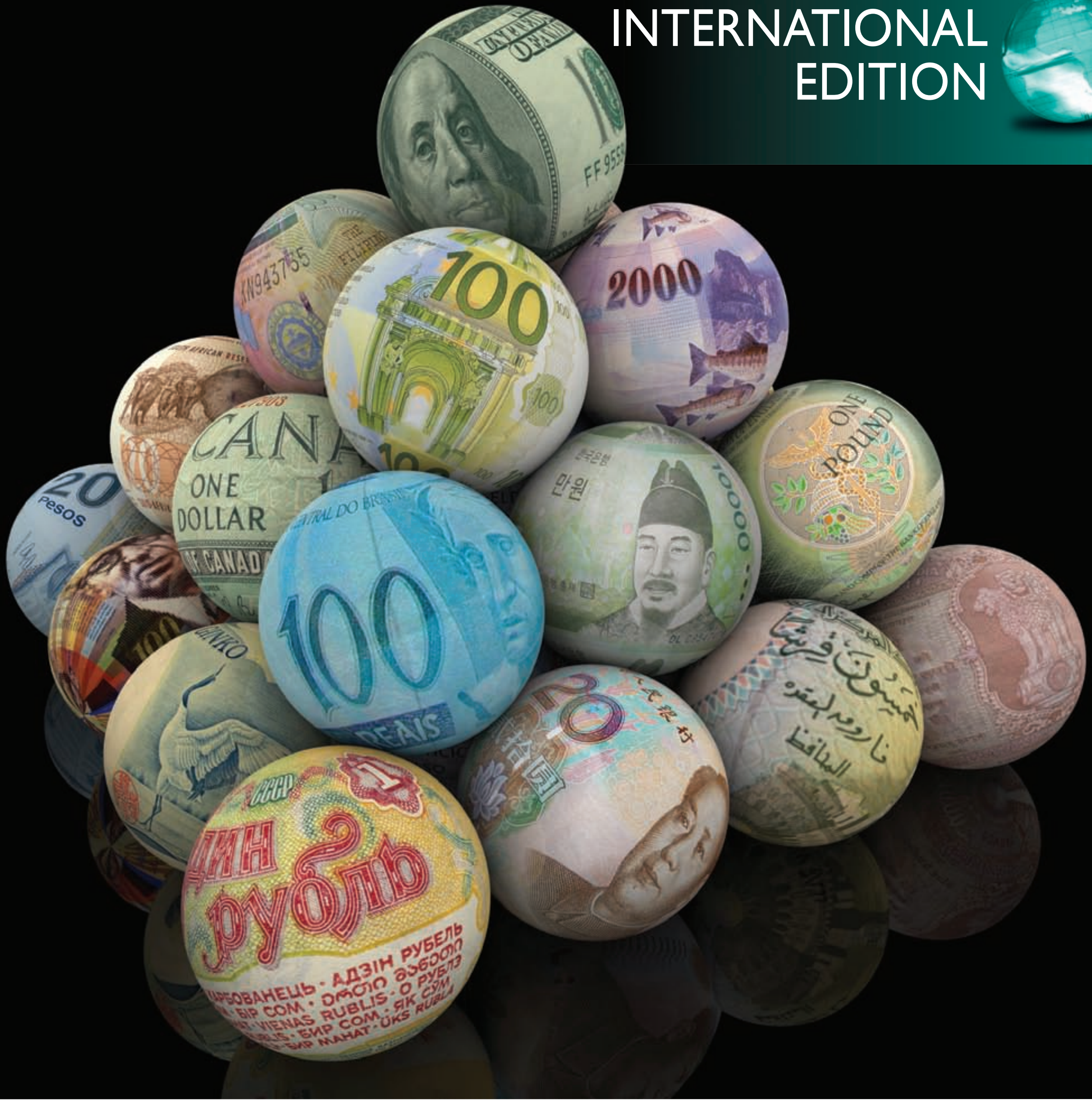
INTERNATIONAL EDITION




# International Economics

NINTH EDITION

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ALWAYS LEARNING

PEARSON


## Groups of Economies

For this map, economies are classified by income group. Low-income economies are those with a GNP per capita of US$995 or less in 2009; lower middle-income, US$996–$3,945; upper middle-income, $3,946–$12,195; and high-income, US$12,196 or more.

- Low-income economies
- Lower middle-income economies
- Upper middle-income economies
- High-income economies
- No data

Map created based on data and classifications from page 341 of the 2011 World Development Report. The World Bank: World Development Indicators (WDI) 2010: World Development Report 2011. http://wdr2011.worldbank.org/sites/default/files/WDR2011_Indicators.pdf.

**product life cycle.** This life cycle involves a stage during which goods are invented and tested in the marketplace. During this period, the production of the good also undergoes considerable experimentation.

**Product life cycle**

The process by which a product is invented and then over time becomes more standardized as consumers and producers gain familiarity with its features.

Later, when the product is successful and becomes firmly established in the marketplace, a standardization process occurs. During this period, competing products from different manufacturers take on an increasingly common appearance, and the manufacturing processes used to make the good also become increasingly identical. At this point, the product has matured. It may be sold for many years in this stage, or it may be displaced over time by new inventions.

How does the product life cycle relate to comparative advantage? The answer is simple. Early in a product's life, the country that invents the product has a comparative advantage. As the country exports the good to the rest of the world, and as the product becomes increasingly more standardized, it is possible for competing firms in other countries to begin to gain market share, if these firms have a cost advantage in large-scale manufacturing. In such instances, comparative advantage shifts from the inventing country to countries where manufacturing costs are lower.

Note how this model can be used to reconcile the Leontief paradox. Let us assume that the United States is an innovating country that produces many new products. The United States will have a comparative advantage in recently invented manufactured goods. Because these goods have yet to become standardized, their production is apt to be quite labor intensive. Investment in fixed capital is likely to be postponed until it becomes certain which features are most popular with the public and how best to automate the production of the good. Thus, U.S. exports will tend to be labor intensive. And, because standardization involves the adoption of more capital-intensive production techniques, if later the United States loses its comparative advantage in a good and begins to import it, this good will tend to be capital intensive.*

The product life cycle model is a model that has limited applicability. It represents an attempt to explain trade in manufactured products that require some degree of technical sophistication in their invention, design, and development. In some cases, the theory seems to fit the facts. For instance, color television was invented in the United States, and in the early days of the product, the United States produced and exported this good. Then, over time, the production of color televisions has shifted almost entirely to countries such as Japan, Taiwan, Korea, and elsewhere.

For other sophisticated products, such as computers and aircraft, the model seems to do less well. The United States, which took the lead in the development of these goods, still retains a substantial comparative advantage despite the fact that each is now a relatively mature product. These examples point to the fundamental weakness of the product life cycle model—its inability to generalize its predictions about the timing of changes in the location of comparative advantage.†

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* In an interesting paper, Richard Brecher and Eshan Choudhri show how the existence of newly invented products can be used to explain the Leontief paradox. In particular, they show that even if the United States were capital abundant, if its newly invented goods were labor intensive in their production, then U.S. trade patterns would tend to have the features detected by Leontief. See "New Products and the Factor Content of International Trade," *Journal of Political Economy* (1984).

† A study by Joseph Gagnon and Andrew Rose casts further doubt on the importance of the product life cycle in explaining trade flows. They looked at detailed data on U.S. and Japanese trade flows over the period from 1962 to 1988. They found that most goods that were net U.S. exports (imports) in 1962 were also net U.S. exports (imports) in 1988. Similar results held for Japan. This finding is inconsistent with the notion that the location of comparative advantage shifts over time, as is implied by the product life cycle model. See "Dynamic Persistence of Industry Trade Balances: How Pervasive Is the Product Cycle?" *Oxford Economic Papers* (1995). Two more recent studies of disaggregated trade flows find support for at least some of the predictions of the product life cycle model. Robert Feenstra and Andrew Rose cite evidence that countries that export products early in the product life cycle tend to have high productivity and faster growth rates; see "Putting Things in Order: Trade Dynamics and Product Cycles," *Review of Economics and Statistics* (2000). Susan Zhu shows that the transfer of production of certain goods to less advanced countries helps to explain a rise in the wages paid to skilled workers in those countries relative to wages paid unskilled workers; see "Can Product Cycles Explain Skill Upgrading?" *Journal of International Economics* (2005).

## Similarity of Preferences Theory

All the theories we have discussed so far have one common theme: The source of comparative advantage is found on the supply side. That is, the country with the lowest autarky cost of production will export the product. The differences between the theories we have examined lie in which factors tend to explain why costs are lower in one country than in another. Stefan Linder has argued that an explanation for the direction of trade in differentiated manufactured products lies on the demand side rather than the supply side.* Consequently, for trade in manufactured goods, he would reject all the explanations we have considered, offering a novel alternative.

Linder's hypothesis can be described as follows: In each country, industries produce goods designed to please the tastes of the consumers in that country. However, not every consumer is alike. Some prefer alternative products, with slightly different characteristics. International trade provides a means to obtain these goods. The advantage of international trade, then, is that consumers benefit from a wider variety of goods.

Going further, Linder's hypothesis explains which types of countries are most likely to trade with each other. Countries with similar standards of living (per capita GDP) will tend to consume similar types of goods. Standards of living are determined in part by the factor endowments of countries. Countries with large amounts of capital per worker tend to be richer than countries with lower amounts of capital per worker. Thus, there should be a considerable volume of trade between countries with similar characteristics. Rich countries will tend to trade with other rich countries, and poor countries with other poor countries. This implication of Linder's hypothesis provides a sharp contrast to the predictions of the HO model, in which countries with dissimilar factor endowments would seem to have the greatest incentives to trade with each other, because they would exhibit the greatest disparity in pretrade relative prices. And the prediction that is one of the trade patterns we noted in Chapter 1.

Several additional points bear noting. First, Linder's theory applies only to differentiated manufactured products. He tends to explain trade in raw materials or agricultural products by using an HO-type model. Second, since he rejects the HO explanation for trade in manufactured goods, he finds nothing paradoxical about the Leontief paradox. Rather, Leontief's findings might simply reflect a desire on the part of American consumers for capital-intensive goods.

**Intraindustry trade**

The simultaneous import and export of similar types of products by a country.

Third, Linder's model provides an explanation for an important phenomenon in international trade, **intraindustry trade**. This type of trade occurs when countries both export *and* import the same kinds of products. Simple models of comparative advantage would seem to rule out this type of trade behavior. However, if, as Linder suggests, trade takes place to satisfy the need for variety in consumption, then it should not be surprising that a country such as the Netherlands exports Heineken beer and imports Löwenbräu. Finally, we note that despite the appeal of Linder's hypothesis, early studies of the theory revealed little empirical support. Several more recent studies, however, report evidence in favor of Linder's theory.† In addition, the growing importance of intraindustry trade has spurred the development of alternative theories of the supply side of the economy capable of explaining this phenomenon. We now turn to a discussion of these issues.

## INTRAINDUSTRY TRADE

Examples of intraindustry trade are not hard to find in the real world. Computers made by Dell are exported to countries around the world at the same time that Americans import computers made by Hitachi, NEC, and other foreign companies. Similarly, while Boeing exports commercial

* Linder presented his hypothesis in his book *An Essay on Trade and Transformation* (New York: John Wiley and Sons, 1961).

† See Jerry and Marie Thursby, "Bilateral Trade Flows, the Linder Hypothesis, and Exchange Risk," *Review of Economics and Statistics* (1987); Jeffrey Bergstrand, "The Heckscher–Ohlin–Samuelson Model, the Linder Hypothesis, and the Determinants of Bilateral Intra-Industry Trade," *Economic Journal* (1990); Carsten Fink, Beata Smarzynska Javorcik, and Mariana Spatareanu, "Income-Related Biases in International Trade: What Do Trademark Registration Data Tell Us?" *Review of World Economics* (2005); and Juan Hallak, "A Product-Quality View of the Linder Hypothesis," *Review of Economics and Statistics* (2010).

**TABLE 5.3** Intraindustry Trade by Country, 2006[a]

| | | | | | |
|---|---|---|---|---|---|
| Czech Republic | 62.2 | Malaysia | 46.6 | Bulgaria | 28.7 |
| Austria | 60.6 | Thailand | 44.9 | Ukraine | 27.4 |
| France | 60.0 | Singapore | 44.2 | Ireland | 25.0 |
| Canada | 59.9 | Israel | 43.0 | Turkey | 21.7 |
| Germany | 57.0 | Philippines | 42.8 | Costa Rica | 21.2 |
| Switzerland | 56.1 | Korea | 41.2 | Greece | 21.0 |
| Hungary | 54.3 | Luxembourg | 40.7 | Australia | 19.8 |
| Belgium | 53.6 | Finland | 40.3 | Hong Kong | 19.1 |
| United Kingdom | 52.5 | Japan | 39.8 | Venezuela | 17.5 |
| Slovenia | 52.3 | Taiwan | 39.3 | Morocco | 15.0 |
| Netherlands | 51.6 | Brazil | 37.3 | Russia | 14.6 |
| Sweden | 51.1 | Norway | 34.2 | Colombia | 14.5 |
| Denmark | 51.1 | Romania | 33.0 | Iran | 10.6 |
| United States | 50.3 | India | 31.8 | Chile | 9.5 |
| Spain | 50.3 | Argentina | 31.3 | Pakistan | 8.7 |
| Italy | 49.7 | Croatia | 30.6 | Kazakhstan | 8.1 |
| Slovak Republic | 48.7 | China | 30.5 | Vietnam | 7.7 |
| Portugal | 48.5 | New Zealand | 29.6 | Saudi Arabia | 7.0 |
| Mexico | 47.8 | South Africa | 29.4 | United Arab Emirates | 6.0 |
| Poland | 47.2 | Indonesia | 29.1 | Bangladesh | 1.6 |

*Notes*: [a]Grubel-Lloyd indices calculated using 3 digit-level product categories from total trade. Countries in the table represent 60 largest trading countries in 2006.

*Source*: Marius Brulhart, "An Account of Global Intraindustry Trade: 1962–2006," background paper, World Bank Development Report 2009, http://wdronline.worldbank.org/worldbank/a/nonwdrdetail/122.

aircraft, some American airline companies have purchased aircraft made by Airbus, a European manufacturer. Despite these examples, the extent to which intraindustry trade occurs is an open empirical question.

Some studies have argued that intraindustry trade is pervasive. Consider Table 5.3. There, we show estimates of the degree of intraindustry trade for the 60 largest trading economies in 2006. The measure of intraindustry trade (IIT) employed in this table is the Grubel–Lloyd index given by Equation 5.1:

$$IIT = 100^{*}\left(1 - \frac{\sum_{j=1}^{n}|X_j - IM_j|}{\sum_{j=1}^{n}|X_j + IM_j|}\right) \qquad \textbf{(5.1)}$$

where $X_j$ equals exports of goods from industry $j$; $IM_j$ equals imports of goods from industry $j$; and there are n different industries.* Theoretically, values of IIT can be as high as 100. This would occur if all the trade of a country were intraindustry and if trade in each product category were

* See Herbert G. Grubel and Peter J. Lloyd, *Intra-Industry Trade* (London: Macmillan, 1975).

exactly balanced (e.g., if exports of cars were equal to imports of cars, exports of computers were equal to imports of computers). If none of the trade of a country is intraindustry trade but overall trade is balanced, then the value of IIT is zero.

As the data in the table clearly show, there is a wide disparity in the amount of intraindustry trade in the world. In general, countries displaying the highest degree of intraindustry trade are industrialized countries, especially those in Western Europe. Developing countries and countries that produce raw materials such as petroleum or that specialize in agricultural and other food products exhibit a much smaller proportion of intraindustry trade.

The data in Table 5.3 come from a study by Marius Brulhart prepared for the World Bank in 2009.* This report looks at the growth of intraindustry trade over the 40 year period from 1962 to 2006. Among other findings, Brulhart shows intraindustry trade has been growing over time for virtually every country in the study. The largest growth of this type of trade has been in high- and middle-income countries. Intraindustry trade is not very important for African countries. Brulhart concludes that an important reason for the growth in intraindustry trade is the growth of multicountry chains of production for many goods.†

The existence of intraindustry trade would seem to contradict the models of comparative advantage we have studied so far. After all, if a country has a comparative advantage in a product, why would it ever import it? Several answers to this question are consistent with models such as the HO model. For instance, consider the role of transportation costs. On the east coast of North America, timber is exported from the United States to Canada. On the west coast, trade in timber moves in the opposite direction. Such trade can be explained by the fact that it is cheaper to transport timber from British Columbia south to the United States than it is to transport it east to Ontario. Thus, Ontario tends to import timber from the United States, even though (western) Canada is relatively well endowed with timberland.

A second explanation for intraindustry trade that is consistent with standard models of comparative advantage has to do with the construction of the data used by economists to measure intraindustry trade. Obviously, there are hundreds of thousands of different types of products that can be traded. (To convince yourself of this, think of all the different kinds of clothing that exist.) How do governments keep track of trade in all these different items?

In some cases, governments aggregate data according to the end-use characteristics of products. Consider desks. All desks serve relatively the same purpose, but they can be manufactured using quite different materials. For instance, they can be made from wood or metal. Countries that have large quantities of metal ores and metal-smelting facilities should have a comparative advantage in the production of metal desks. Countries with large endowments of timber would have a comparative advantage in wooden desks. Thus, even in an HO world it is possible for a country to both export *and* import desks, so long as exports and imports were manufactured using different inputs and so long as consumers view these goods as less than perfect substitutes for each other.

Added to the problem that goods with similar uses can be made in different ways is a second problem: Often there are so many goods that data storage and presentation restrictions require further consolidation of data to include trade in even more dissimilar goods. For example, cotton sweaters are added with wool sweaters to form a category called *sweaters.* Then, sweaters are added with other types of clothing, such as shirts, suits, and dresses, to form a category called *apparel.* The same sort of aggregation occurs in other industry data groupings. Thus, it is easy to imagine

* Marius Brulhart, "An Account of Global Intraindustry Trade: 1962–2006," background paper, *World Bank Development Report 2009*, http://wdronline.worldbank.org/worldbank/a/nonwdrdetail/.

† Other studies of intraindustry trade include Don P. Clark, "Recent Evidence on Determinants of Intra-Industry Trade," *Weltwirtschaftliches Archiv* (1993); David Greenaway, Robert Hine, and Chris Milner, "Vertical and Horizontal Intraindustry Trade: A Cross Industry Analysis for the United Kingdom," *The Economic Journal* (1995); Roy J. Ruffin, "The Nature and Significance of Intra-Industry Trade," *Economic & Financial Review* (Federal Reserve Bank of Dallas, 1999); and Patricia Rice, Martin Stewart, and Anthony Venebles, "The Geography of Intra-Industry Trade: Empirics," *Topics in Economic Analysis & Policy* (2003).

that some intraindustry trade is purely a statistical phenomenon, one that would go away if economists had access to highly detailed data on trade (e.g., data on trade in cotton versus wool sweaters). Unfortunately, even the most highly disaggregated data that are available to economists include combinations of items whose potential two-way trade could be explained by factor requirements in production.

## INCREASING RETURNS AND IMPERFECT COMPETITION

Despite the examples just presented, there is good reason to think that a considerable proportion of intraindustry trade is not explainable by problems of data aggregation and categorization. Other explanations of intraindustry trade must be explored. One idea that has been receiving increasing amounts of attention by economists has to do with the role of **increasing returns to scale** in the production process. In this section we define increasing returns to scale and describe the implications for the presence of increasing returns to scale on domestic industrial structure. Then, we turn to a discussion of the relationship between increasing returns to scale and international trade.

**Increasing returns to scale**
A technological situation in which proportionate increases in the use of productive inputs lead to greater than proportionate increases in output.

Increasing returns to scale are said to exist when a proportionate increase in the use of factors of production results in a greater than proportionate increase in output. For instance, if, by doubling the size of an automobile factory and the number of autoworkers, automobile output more than doubles, then automobile production is said to experience increasing returns to scale. The notion of increasing returns can be applied either to a firm or to an industry as a whole. In either case, the long-run average cost curve of the firm (or industry) falls as its output increases.

Increasing returns to scale may be external or internal to individual firms in an industry. In the first case, as increasing resources are devoted to the production of a good, the cost curves of all firms in the industry shift down. This situation seems to describe well what happened to American agriculture in the nineteenth century. As the Midwest and Great Plains were settled and more farms were established, it became profitable to build railroad lines to ship grain to markets and for manufacturers of farm implements to begin production. The growth in the transportation infrastructure and the increased availability of factors of production helped to the lower the costs of production for all farmers.

If one or more industries in an economy exhibit increasing returns to scale technology, this will affect the shape of a country's PPF. To see this, suppose that both soybeans ($S$) and textiles ($T$) enjoy external economies and that these two industries use capital and labor in the same proportions. In Figure 5.1 we derive the PPF for this country. Point $E$ ($F$) represents the maximum amount

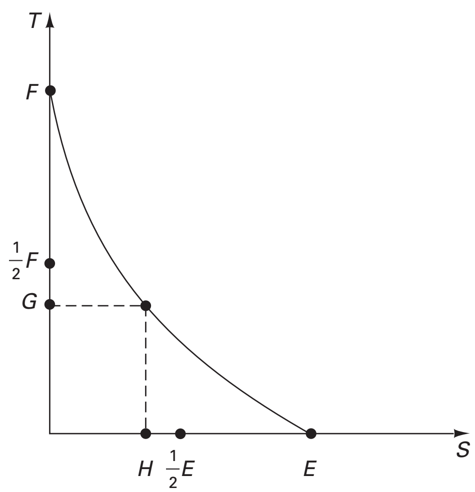


**FIGURE 5.1** PPF of a Country with Increasing Returns to Scale Industries

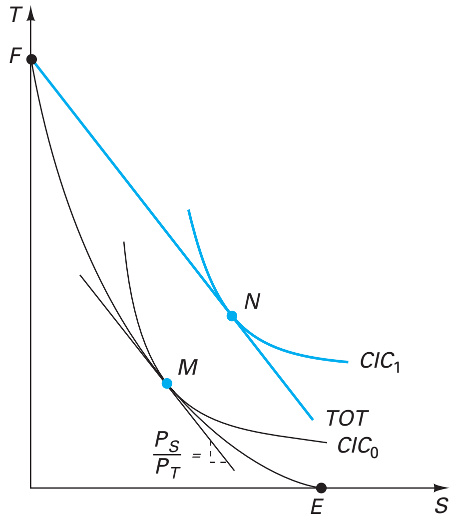


**FIGURE 5.2** Increasing Returns to Scale and Gains from Trade

of *S* (*T*) the country can produce if it were to specialize completely in the production of that good. These points determine the end points of the PPF. Now, suppose that beginning from point *E*, resources are allocated away from *S* in such a way that each industry ends up with exactly half of all factors of production. We know that output of *S* will fall by more than one-half its original level. That means that the new level of production of *S* will be at a point such as point *H* on the diagram. Because *T* now has half the available resources, its output will rise. However, because it too enjoys increasing returns to scale, *T* will produce an output level less than half of what it would produce if it had all available factors. That is, it would produce at a point such as point *G*. Thus, we have established that increasing returns to scale typically result in PPFs that are convex to the origin.*

Figure 5.2 illustrates a country with *S* and *T* industries that both exhibit increasing returns to scale. The autarky equilibrium for this country is at point *M*, where the PPF is tangent to the highest attainable community indifference curve ($CIC_0$). The autarky relative price is given by the slope of the PPF at the tangency point. Note that autarky is not a very desirable equilibrium for this country. At existing prices, it would be better off by specializing in the production of one good (e.g., good *T*), maximizing the gains from increasing returns to scale, and trading its surplus production in world markets for the other good. This is illustrated in the diagram by an international trade equilibrium of point *N*. Figure 5.2 is drawn under the assumption that the international terms of trade are identical with the autarky relative price. This is not required and, indeed, is not likely to happen in the real world. However, the diagram clearly makes the point that, unlike the previous models we have studied, here the benefits from trade occur not because of the opportunity to trade in world markets at prices that are more advantageous than autarky prices but because international trade allows a country to specialize in industries where average costs fall (and therefore productivity rises) as additional resources are utilized. Thus, we see an entirely new reason for international trade. Trade allows countries the opportunity to expand production so as to achieve gains from increasing returns to scale technology.

Note that by assumption the country we have been describing could have specialized in the production of *S* instead and also experienced gains from trade. As drawn, if it had done so,

* This need not always be true. However, the conditions wherein concave PPFs occur even with increasing returns to scale are beyond the scope of this book.