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## CHAPTER 2

### Absolute Advantage

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Throughout most of the 1980s, Vietnam imported rice. In 1989, however, Vietnam *exported* more than 1 million tons of rice. In the 1990s, its annual rice exports increased to more than 3 million tons. Despite a fall in rice exports in 2004, Vietnam was expected to export 6 million tons of rice in 2009. As discussed in Goldin and Reinert (2007, Chapter 3), despite being the staple consumption crop in Vietnam, the expansion of rice exports helped to alleviate poverty in that country through increased employment and wage income. This beneficial increase in rice exports represents one important aspect of Vietnam's entry into the world economy through the process of trade expansion we discussed in Chapter 1.

Why does a country export or import a particular good? This chapter makes a first step in helping you to answer this fundamental question by utilizing a framework that should be familiar to you from your introductory economics class: the supply and demand diagram. We are going to use this diagram to illustrate an important concept in international economics, that of **absolute advantage**. Absolute advantage refers to the possibility that, due to differences in supply conditions, one country can produce a product at a lower price than another country.<sup>1</sup> In this chapter, we will consider the product rice and the fact that Vietnam can produce rice more cheaply than Japan. This situation will cause rice to be exported from Vietnam to Japan. It will also involve what international economists call the **gains from trade**, which benefits *both* Vietnam *and* Japan. These gains are what motivate countries to take part in trading relationships. In terms of the analytical elements outlined in Chapter 1, we will focus on *countries* and *sectors* with some mention of *factors of production*.

### Supply and Demand in a Domestic Market

Throughout the world, rice is exchanged in markets. While these markets are international, let's assume for a moment that we can analyze a single domestic market in isolation. This will help orient you to the supply and demand model. Figure 2.1 illustrates

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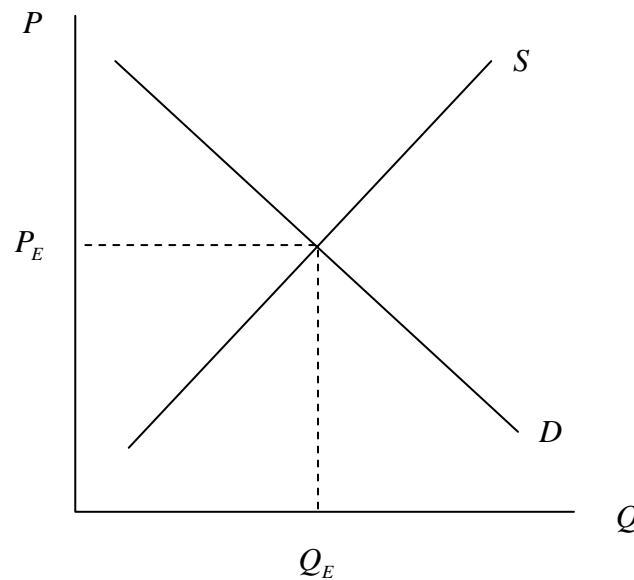
<sup>1</sup> For an alternative approach, see Van Marrewijk (2009).

such a market. The diagram has two axes. The horizontal axis plots the quantity ( $Q$ ) of rice in tons. The vertical axis plots the price ( $P$ ) of rice per ton. There are two curves in the diagram identified by the symbols  $S$  and  $D$ .  $S$  is the supply curve and represents the behavior of domestic rice-producing firms.  $D$  is the demand curve and represents the behavior of domestic consumers of rice, both firms and households.<sup>2</sup>

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Figure 2.1. A Domestic Rice Market

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There are a number of properties of the supply and demand curves in Figure 2.1 that are important to understand. Let's take the supply curve first. It is upward sloping, and this indicates that firms supply more rice to the market as the price increases. Consequently, changes in price are represented in the diagram by *movements along* the supply curve. These movements are known as **changes in quantity supplied**. There are two additional supply-side factors relevant to the supply curve. These are input or factor prices and technology. Reductions in input prices and improvements in technology shift the supply curve to the right. This means that producers supply more rice than before at every price. Increases in input prices and technology setbacks shift the supply curve to the left. This means that producers supply less rice than before at every price. We can see that changes in input prices and technology are represented by *shifts of* the supply curve. These shifts are known as **changes in supply**.

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<sup>2</sup> Firms consuming rice use it as an intermediate product to produce a final product such as rice flour or a restaurant meal.

Now let's take a look at the rice demand curve. It is downward sloping, and this indicates that consumers demand less rice from the market as the price increases. Consequently, changes in price are represented in the diagram by *movements along* the demand curve. These movements are known as **changes in quantity demanded**. There are a number of additional demand-side factors relevant to the demand curve. Two important ones are incomes and preferences.<sup>3</sup> Increases in incomes and increased preference for rice consumption shift the demand curve to the right. This means that consumers demand more rice than before at every price. Decreases in incomes and decreased preference for rice consumption shift the demand curve to the left. This means that consumers demand less rice than before at every price. Consequently, changes in incomes and preferences are represented by *shifts of* the demand curve. These shifts are known as **changes in demand**.

Finally, the intersection of the supply and demand curves in Figure 2.1 determines the equilibrium in the domestic rice market. In this diagram, the equilibrium price is  $P_E$ , and the equilibrium quantity is  $Q_E$ . Given what we have just stated about the role of input prices, technology, incomes, and preferences in shifting the two curves in Figure 2.1, you can see that any such shifts will change the equilibrium price and quantity for rice by shifting the demand or supply curves. These sorts of changes are natural parts of market processes.

As we stated above, rice markets are actually international. Therefore, we cannot analyze them effectively using Figure 2.1. In the next section, we consider how to account for the international character of rice markets in the supply and demand framework.

## Absolute Advantage

Rice is produced in many countries, but to simplify, suppose we consider just Vietnam and Japan. To help us analyze the international rice market that arises between these two countries, we are going to make a simplifying assumption about the demand side of the rice market in both Vietnam and Japan. More specifically, we assume that *demand conditions are exactly the same in both countries*. That is, there are no differences in preferences, incomes, or the way demand responds to price changes in Vietnam and Japan. This implies that the demand curves for rice in the two countries are exactly the same as illustrated in Figure 2.2.

The reason we make this simplifying demand-side assumption is that trade often arises due to differences in supply conditions rather than in demand conditions. Indeed, much of the field of trade theory is based on various explanations for these supply-side differences among countries. Therefore, we will allow supply conditions for rice to differ between Vietnam and Japan. In particular, we will assume that the supply curve for Vietnam is farther to the right than the supply curve for Japan, which means that at every

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<sup>3</sup> Other demand side factors are prices of related products, wealth and expectations. Changes in these factors shift the demand curve as do changes in income and preferences.

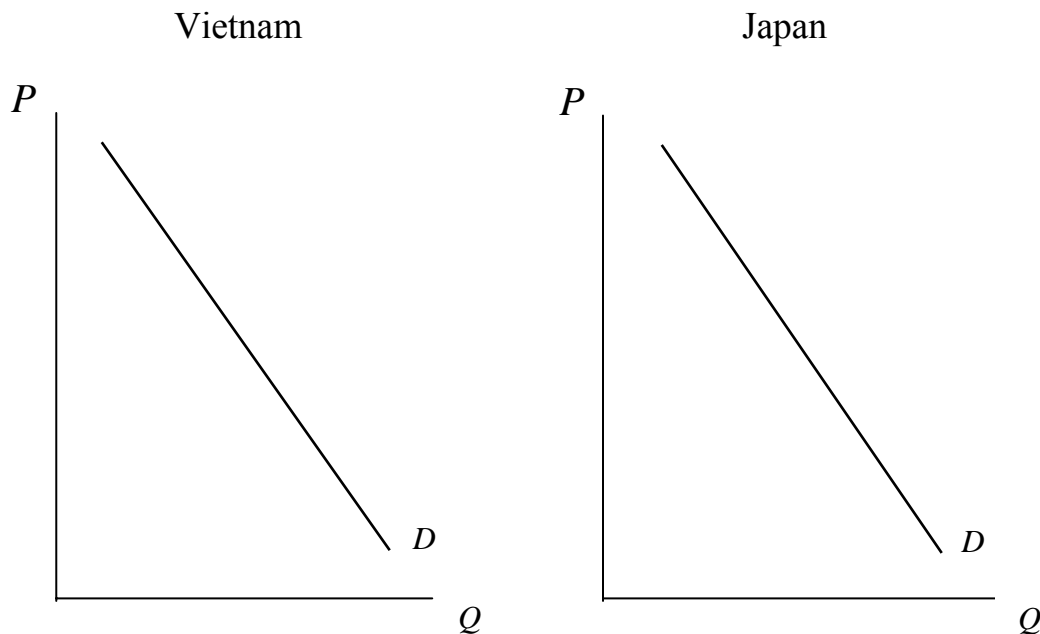
price Vietnam supplies more rice than Japan. Why might this be? One possibility is that Vietnam produces rice using *technology* superior to Japan so that labor productivity in rice production in Vietnam is higher than in Japan. This possibility, however, is not relevant to rice production in these two countries.<sup>4</sup> Another possibility is that the prices for *inputs* used in rice production are lower in Vietnam than in Japan. This, in turn, could reflect the fact that Vietnam is more abundantly endowed with rice production factors (available land and agricultural labor) than Japan. It is this latter factor that is relevant in the current case.

This situation is depicted in Figure 2.3. The upward sloping supply curves reflect the positive relationship between price and quantity supplied. The difference in supply conditions positions Vietnam's supply curve farther to the right than Japan's supply curve. The intersections of the supply and demand curves determine the equilibrium prices of rice in the two markets. The two prices are recorded as  $P^V$  and  $P^J$  in the figure. Since no trade is involved, these two prices are known in international economics as **autarky** prices. Autarky is a situation in which a country has no economic relationships with other countries.

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Figure 2.2. Demand for Rice in Vietnam and Japan

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<sup>4</sup> For a case where technology is relevant, see the box below on Japan's advantage in industrial robots.

Figure 2.3 depicts a situation in which the autarky price of rice is lower in Vietnam than in Japan. That is:

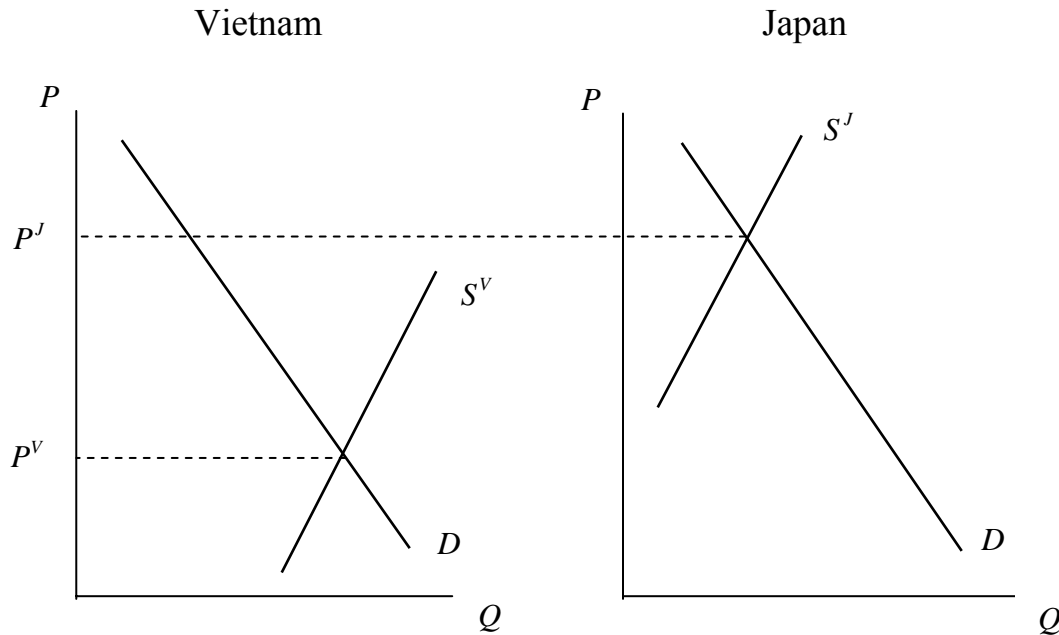
$$P^V < P^J \quad (2.1)$$

In international trade theory, this situation is interpreted as Vietnam having an **absolute advantage** in the production of rice vis-à-vis Japan. This absolute advantage reflects the differences in supply conditions in the two countries. The presence of absolute advantage makes international trade a possibility. This we consider in the following section.

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Figure 2.3. Absolute Advantage in the Rice Market

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## International Trade

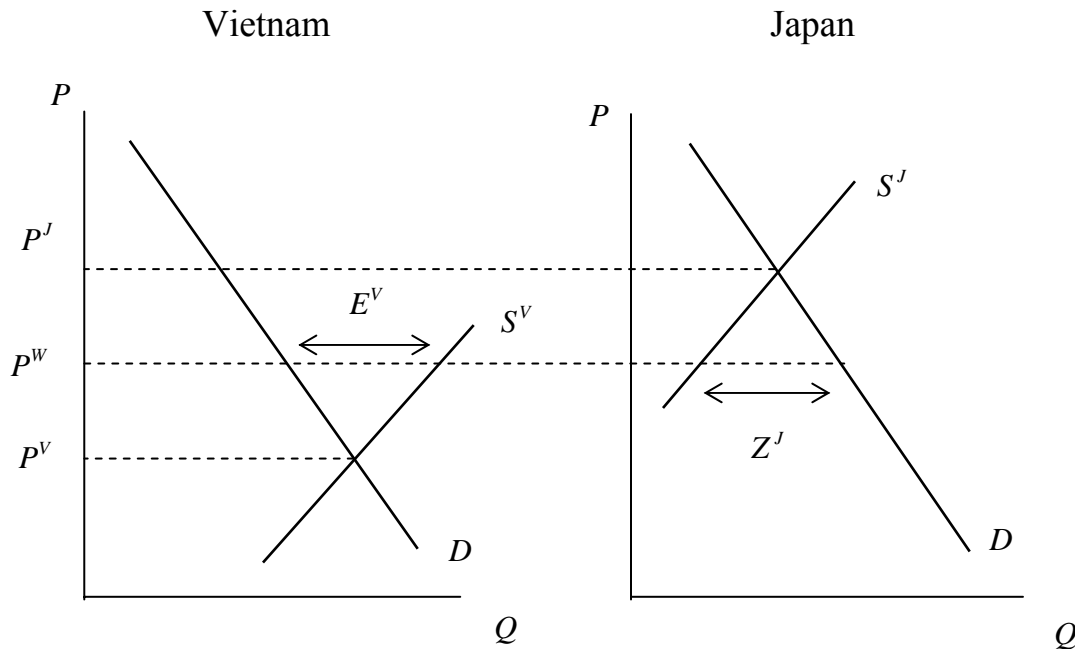
The idea of absolute advantage was first stated in Adam Smith's *Wealth of Nations*, published in 1776. Adam Smith stated the following. "If a foreign country can supply us with a commodity cheaper than we ourselves can make it, better buy it of them with some part of the produce of our own industry, employed in a way in which we have some advantage" (1937, p. 424). In other words, a pattern of absolute advantage implies a potential pattern of trade. How does this apply to our example? If the two countries move

out of autarky and begin to trade, the world price of rice  $P^W$  will lie somewhere between the two autarky prices as follows:

$$P^V < P^W < P^J \quad (2.2)$$

This situation is depicted in Figure 2.4. In the movement from autarky to trade, Vietnam experiences an increase in the price of rice to the world level (from  $P^V$  to  $P^W$ ). Quantity supplied will increase, while quantity demanded will decrease. The amount by which quantity supplied exceeds quantity demanded in Vietnam constitutes its *exports* of rice,  $E^V$ . Japan experiences a decrease in the price of rice to the world level (from  $P^J$  to  $P^W$ ). Here, quantity supplied will decrease, while quantity demanded will increase. The amount by which quantity demanded exceeds quantity supplied in Japan constitutes its *imports* of rice,  $Z^J$ .<sup>5</sup> The country that has an absolute advantage (Vietnam) expands its quantity supplied and exports the good in question, while the trading partner (Japan) contracts its quantity supplied and imports the good.

Figure 2.4. Trade in the Rice Market



<sup>5</sup> We use a “Z” to denote imports throughout this book. Why Z? As we will see, “I” is used in economics to denote investment, and “M” is used to denote money. Therefore, we cannot use the first two letters of the word “imports.”

The associations you should have in your mind from the preceding discussion are presented in Figure 2.5. The starting points are comparative levels of technological proficiency and endowments of factors used in the production of the sector's product. The latter affects the relevant input prices for a sector in a country. Vietnam, for example, has lower domestic prices for rice-growing land and labor. These technological and factor characteristics determine a pattern of absolute advantage between two countries. This pattern of absolute advantage, in turn, can generate a pattern of trade. Vietnam tends to export rice, while Japan tends to import rice. Another example in which Japan's technological proficiency in the production of industrial robots is given in the accompanying box.

### **Japan's Advantage in Industrial Robots**

The word "robot" first appeared in 1921 in a Czech play written by Karel Čapek, based on the Czech word "robota," meaning drudgery. The world's first industrial robot was built in the United States by the industrialist Joseph Engelberger who founded the company Unimation in 1956 and installed the first industrial robot in 1961. Engelberger had a moment of fame in 1966 when one of his robots appeared on Johnny Carson's *Tonight Show*, opening and pouring a can of beer for Johnny Carson. In 1967, Engelberger was invited to Japan and addressed 600 Japanese scientists and business executives. As a result, Japan imported its first industrial robots from the United States. In 1969, robot production began in Japan under a licensing agreement with Unimation. In 1972, the Japan Robot Association was founded. Thus began Japan's involvement with what has been called "the most important manufacturing innovations of recent times" (Mansfield, 1989, p. 19).

Japan's first exports of industrial robots began in 1975. Thereafter, exports grew slowly but steadily. By the end of the 1980s, Japan became the leader in most areas of the robotics industry such as numerical controllers, machine tools, motors, and optical sensors. It accounted for one half of the world production of industrial robots. The technological nature of Japan's advantage in robot production was captured by Porter (1990): "The pace of innovation and new product introduction among the Japanese firms was feverish. Product innovations were soon imitated or upstaged by other producers. For example, the American firm Adept Technology introduced the world's first commercially successful direct-drive robot near the end of 1984. Less than a year later, seven Japanese firms, including Yamaha, Matsushita, and FANUC, introduced direct drive robots" (p. 235). Along with faster innovation times, Japanese firms benefited from lower innovation costs. There is some evidence that Japan's faster innovation times and lower innovation costs were due to a greater emphasis on manufacturing over marketing in the innovation process in comparison with the United States.

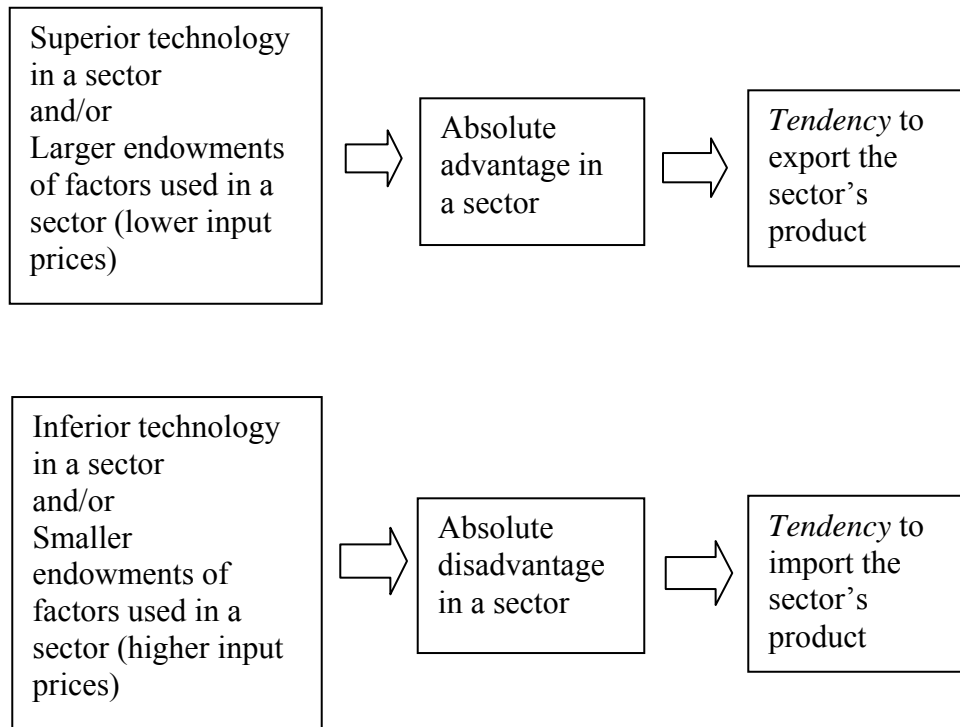
Accompanying and contributing to Japan's technological lead in industrial robots was the degree of competition in the Japanese industrial robots industry. With fewer than 10 firms in 1968, the industry expanded to nearly 300 firms by 1987 and declined to

approximately 150 firms in 2000. Another important factor has been *intra-firm diffusion*, where firms requiring the use of robots (such as the electronic equipment industry) begin producing robots for their own use. A final factor pushing the use of robots in Japan is the presence of significant labor shortages in many areas; robots replaced humans where these shortages appeared. As of 1997, Japan used one robot for every 36 manufacturing employees, while the United States used only one robot for every 250 manufacturing employees. Currently, one half of the world's industrial robots are installed in Japan.

Despite these long-term positive factors, the Japan Robot Association (2001) pointed to some weaknesses. The industry has had difficulty moving out of large industrial applications of robots into the biotech, medical and consumer applications and leveraging venture capital. In contrast to past models of technological innovation characterizing Japan, the JRA calls for a focus on small business and greater openness. This, it is hoped, will position the industry for a different set of robotic applications with promising future growth prospects.

Sources: *The Economist* (1980), Horiuchi (1989), Mansfield (1989), Porter (1990), and Tanzer and Simon (1990) and Japan Robot Association (2001).

Figure 2.5. A Schematic View of Absolute Advantage



It is important to stress here that Figure 2.5 is only a *preliminary* look at international trade. In the real world, international trade is actually determined by **comparative advantage** rather than absolute advantage. This is why we use the words “tendency” in the far right-hand boxes of the figure. Consequently, you will not have a full appreciation of how international trade is determined until you complete Chapter 3. Nevertheless, our discussion in this chapter is useful in order to understand how the traditional supply and demand framework must be modified to account for trading relations and to understand the gains from trade.<sup>6</sup>

A question that often arises in students’ minds is: What ensures that the amount exported by Vietnam is the same as the amount imported by Japan? The answer is that, if  $E^V$  were smaller than  $Z^J$ , there would be excess demand or a shortage in the world market for rice. As we know from introductory microeconomics, excess demand causes the price to rise. As  $P^W$  rose, exports of Vietnam would increase and imports of Japan would decrease until the excess demand in the world market disappeared. Similarly, if  $E^V$  were larger than  $Z^J$ ,  $P^W$  would fall to bring the world market back into equilibrium.

Before moving on to discuss the gains from trade, another key concept in international economics, let’s summarize what we have shown thus far in a box:

Differences in supply conditions among the countries of the world give rise to complementary patterns of absolute advantage. These patterns of absolute advantage, in turn, make possible complementary patterns of international trade.

## Gains from Trade

Up to this point, we have seen that, given a pattern of absolute advantage, it is possible for a country to give up autarky in favor of importing or exporting. Japan can import rice, and Vietnam can export rice. But *should* a country actually do this? We can answer this question by examining Figure 2.4 from the point of view of **consumer surplus** and **producer surplus**. This is done in Figure 2.6. If for any reason, you do not recall the consumer surplus and producer surplus concepts from your introductory microeconomics course, please consult the appendix to this chapter.

Let us first consider Vietnam. In its movement from autarky to exporting in the rice market, producers experience both an increase in price and an increase in quantity supplied along the supply curve. This should be good for producers, and you can see in Figure 2.6 that there has been an increase in producer surplus of area  $A + B$  as a result of the movement from autarky to trade. Consumers, on the other hand, experience an

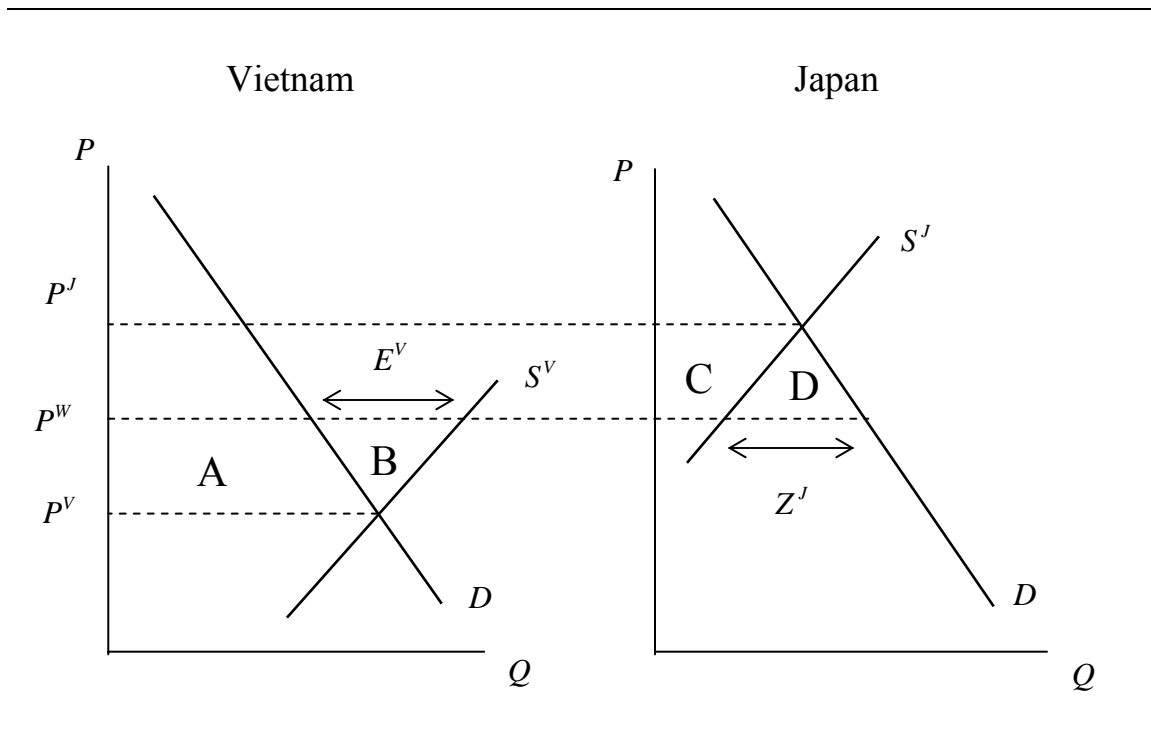
<sup>6</sup> As we will see in Chapter 6, the supply and demand framework is also used to conduct trade policy analysis.

increase in price and a decrease in quantity demanded along the demand curve. This should harm consumers, and you can see in Figure 2.6 that there has been a decrease in consumer surplus of area  $A$ .

What do these effects mean for Vietnam? Producers have gained area  $A + B$ , while consumers have lost area  $A$ . The gain to producers exceeds the loss to consumers. For the economy as a whole, then, there is a *net welfare increase* of area  $B$ . Vietnam gains from its entry into the world economy as an exporter.

Next, consider Japan. In its movement from autarky to importing in the rice market, producers experience a decrease in price and a decrease in quantity supplied along the supply curve. This should harm these producers, and you can see in Figure 2.6 that there has been a decrease in producer surplus of area  $C$ . Consumers, on the other hand, experience a decrease in price and an increase in quantity demanded. These contribute to an increase in consumer surplus of area  $C + D$ .

Figure 2.6. Gains from Trade in the Rice Market



What do these effects mean for Japan? Consumers have gained  $C + D$ , while producers have lost area  $C$ . The gain to consumers exceeds the loss to producers. For the economy as a whole, then, there is a net welfare increase of area  $D$ . Japan gains from its entry into the world economy as an importer.

You can see from the above that moving from autarky to either importing or exporting involves a net increase in welfare for the country involved. This net increase in welfare is known as the **gains from trade**. Not only is it possible for a country to give up autarky in favor of importing or exporting, but it makes sense to do so from the standpoint of overall welfare.

The notion of gains from trade is an important concept. To judge from the tone and content of many popular writings on the world economy, trade relationships are a win-lose proposition for the countries involved. To export is to win; to import is to lose. The gains from trade idea, however, tells us that trade can be *mutually* beneficial to the countries involved. For this reason, you need to be cautious in our assessment of some popular writing of the win-lose variety. While there are specific instances in which trade can be a win-lose proposition, this is not the case for trade in general.<sup>7</sup> For the peculiar case of international advantages in rare earth elements, see the accompanying box.

### Rare Earth Elements

Rare earth. No, not the rock band. Rather, seventeen chemical elements collectively known as “rare earth elements” or REE. REEs are key components in some of the information and communication technology (ICT) discussed in Chapter 1 as drivers of globalization. These include liquid-crystal displays, fiber-optic cables, communication system magnets, and rechargeable batteries. REEs are not actually rare, however. Some of them, for example, are much more common than gold. Despite this abundance, REEs are not usually concentrated enough for commercial mining and there are consequently only a few sources. From 1965 to 1980, most REEs came from the Mountain Pass mine in the Mojave Desert in the United States. Beginning in 1985, advantage switched to the Inner Mongolia region of China. *The Economist* (2009) notes that Communist Party Leader Deng Xiaoping, “declaring rare earths to be the oil of China, encouraged the development of mines in the mid-1980s. Prices fell dramatically and existing mines in America were priced out of business.” Currently, China supplies 95 percent of the global market for REEs.

As China’s own demand for REEs has grown, concern has arisen about the security of supplies. *The Economist* (2009) reports: “sales of (REEs) add up to less than \$2 billion each year. But without them, industries worth trillions of dollars would grind to a halt.” In response to this situation, there has been even talk in the Chinese government about a ban of exports of some important REEs. Consequently, attention has turned to alternative supply possibilities with Western Australia, North America (Alaska and Quebec) and South Africa.

Sources: *The Economist* (2009) and U.S. Geological Survey (2002)

<sup>7</sup> This point was emphasized some time ago by Krugman (1996). Krugman stated that “The conflict among nations that so many policy intellectuals imagine prevails is an illusion; but it is an illusion that can destroy the reality of mutual gains from trade” (p. 84).

## Two Limitations

The notion of absolute advantage, first suggested by Adam Smith in his *Wealth of Nations*, is useful to understanding international trade in the context of the familiar supply and demand framework. It is also useful to understand that trade can improve overall welfare for the countries involved. The concept has its limits, however. In particular, it suggests the possibility that a country could not have an absolute advantage in *anything*, and therefore would have nothing to export at all. This, it turns out, is unlikely. To understand why, we must turn to a more sophisticated notion of trade, **comparative advantage**. We do this in the next chapter.

The notion of the gains from trade also has its limits. It suggests that countries *as a whole* mutually gain from trade. It does not suggest, however, that *everyone within* a country will gain from trade. As you have already understood in the example of this chapter, producers of rice in Japan lose from trade, and consumers of rice in Vietnam lose from trade. We will take up the subject of the winners and losers from trade in earnest in Chapter 5 on the political economy trade.

## Conclusion

Autarky refers to a situation in which a country does not engage in either imports or exports. It is a rare situation. More commonly, countries engage in both importing and exporting relationships with other countries of the world economy. In this chapter, you have begun to understand why. Absolute advantage reflects differences between countries in technology or factor conditions. A country with better technology and larger endowments of the factors necessary to produce an item is more likely to have absolute advantage in the production of that item. It is also more likely to export that item. Patterns of absolute advantage in the world economy also make possible mutual gains from trade in which the overall welfare of the countries involved increase.

The notion of absolute advantage has its limits. First, it suggests that a country might not have anything to export at all. This, as we will see in the next chapter on comparative advantage, is an unlikely outcome. Second, it does not suggest that all persons in a country will gain from trade. Within any country, there can be both winners and losers from international trade. We take up this issue in Chapter 5.

## Review Exercises

1. Use Figure 2.1 to consider the following changes: a fall in incomes due to a recession; an increased preference for rice consumption; an increase in input prices for rice production; and an improvement in rice production technology. Use diagrams to analyze the effects of these changes on equilibrium price and quantity.

2. Create an example of an absolute advantage model by choosing two countries and a single product.
  - a. Draw a diagram describing *autarky* and a *pattern of absolute advantage* for your example.
  - b. Show the transition from autarky to trade in your diagram, label the trade flows, and demonstrate the *gains from trade*.
  - c. In a new diagram, and starting from a trading equilibrium, show what would happen to the world price if *income increased* by exactly the same, small amount in both countries.
  
3. Can you recall from introductory microeconomics the nations of the price elasticity of demand and price elasticity of supply? If so, can you say what would happen to the gains from trade as supply *and* demand in Vietnam *and* Japan become more and more *inelastic*?

### Further Reading and Web Resources

The idea of absolute advantage was first discussed in Chapter II, Book IV of Smith (1937). This book is available in the nonfiction section of [www.bibliomania.com](http://www.bibliomania.com). A much more recent overview can be found in Van Marrewijk (2009). A blog about global rice trade can be found at [rice-trade.blogspot.com](http://rice-trade.blogspot.com).

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## **Appendix: Consumer and Producer Surplus**

Our discussion of the gains from trade in this chapter utilized the notions of consumer surplus and producer surplus. These concepts are illustrated in Figure 2.7. This figure considers equilibrium in a single market. The equilibrium price is  $P_E$ , and the equilibrium quantity is  $Q_E$ . The height of the demand curve shows consumers’ *willingness to pay* for the good in question. For quantities between zero and  $Q_E$ , however, the willingness to pay is *greater than* what consumers actually pay. That is, the height of the demand curve is greater than the market price. This gives the consumers a premium on each unit up to  $Q_E$ , and the sum of the consumer premia is the upper triangle in the figure, consumer surplus.

The height of the supply curve shows the producers’ *willingness to accept* for the good in question. For quantities between zero and  $Q_E$ , however, the willingness to accept is *less than* what the producers actually receive. That is, the height of the supply curve is less than the market price. Producers too, then, receive a premium on each unit up to  $Q_E$ . The sum of the producer premia is the lower triangle in the figure, producer surplus.

In demonstrating the gains from trade in this chapter, we considered the *changes* in consumer and producer surplus that result from the price changes brought on by the move from autarky to trade.

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Figure 2.7. Consumer and Producer Surplus

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