

# SOLUTIONS MANUAL

## MICROECONOMICS

Private Markets and Public Choice



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# Chapter 2

## Opportunity Cost, Specialization, and Trade

### ■ Chapter Overview

In Chapter 2 we show how “the economic way of thinking” (presented in Chapter 1) can be reduced to more rigorous economic principles. The chapter focuses on two fundamental principles: opportunity cost and specialization and trade. The first concept, opportunity cost, provides an effective lead-in to the production possibilities curve, the first economic model encountered in the book. We develop the production possibilities curve in relative depth because of its extensive use and relevance. The model is thoroughly illustrated by examples relating it to the law of increasing costs, unemployment, and the relation between capital goods, consumer goods, and economic growth.

Adam Smith’s famous example of a pin factory introduces the second major theme of the chapter, specialization and trade. We offer numerical examples of the principles of absolute and comparative advantage to help solidify these concepts in the readers’ minds. Unlike many other introductory texts, we introduce the “impediments” to exchange early on. Specifically, exchange costs, transaction costs, and transportation costs are shown to be critical to the understanding of trade and the benefits of trade. The importance of “time costs” is also noted. At the close of Chapter 2, we contrast these costs to artificial barriers to trade, such as tariffs. This discussion could serve as a springboard for you to take up with students current trade relations with a country such as China. In Application we present an example of how theory—in this case production possibilities—underlies many current social issues of the aids crisis.

### ■ Outline

#### **Specialization and Trade: A Feature of All Societies**

#### **Opportunity Cost and Production Possibilities: Individuals and Society Must Choose**

The Law of Increasing Cost

#### **Why the Production Possibilities Frontier Shifts**

The Shifting Frontier

Economic Growth: How Economies Progress

#### **Comparative Advantage**

Specialization

Trade: The Fruits of Specialization

WHY DOES IT MATTER: Specialization Helps Explain Marriage and Divorce

Factors Explaining Comparative Advantage

Exchange Costs

WHY DOES IT MATTER: “Reality Check:” There are Winners and Losers from Free Trade

ECONOMICS IN REAL TIME: Aids and Reduced Production Possibilities in Africa

## ■ Key Terms

opportunity costs	capital stock	exchange costs
division of labor	economic growth	transaction costs
choices at the margin	specialization	transportation costs
production possibilities frontier	marginal opportunity production cost	artificial barriers to trade
law of increasing costs	comparative advantage	tariffs
unemployment of resources	terms of trade	quotas
absolute advantage		

## ■ Learning Objectives

After completing this chapter the student should be able to

1. Define opportunity costs and show how a production possibilities curve illustrates these costs.
2. Identify and explain the ideas that a production possibilities curve illustrates.
3. Explain the law of increasing costs and the cause(s) of increasing costs.
4. Explain what a point inside the production possibilities curve shows.
5. Explain the factors that cause the production possibilities curve to shift outward or inward.
6. Explain what economic growth is and what causes it.
7. Define and describe the differences between comparative and absolute advantage.
8. Understand how people gain from trade.
9. Define exchange costs and explain the different types of exchange costs.
10. Explain the concept of “at the margin” and its role in economic decisions.

## ■ Solutions

### Answer to Economics in Real Time

How do you think the following catastrophic events would affect the production possibilities curve: A hurricane that kills hundreds of thousands in a small developing country? a war that devastates both population and machinery and buildings? a drug that eradicates all infectious diseases?

**Answer:** Anything that decreases the supply of land, labor, and/or capital will decrease the production possibilities curve. Hurricanes and wars will decrease the production possibilities curve. A drug that saves lives will increase the production possibilities.

### Answers to Questions for Review and Discussion

1. What did reading this chapter cost you? Did you include the price of the book? What will reading the next chapter cost? Does that include the price of the book?

**Answer:** The opportunity cost of reading this chapter is the value of the next best alternative forgone. The price of the book has already been incurred (if you have purchased the book) and therefore is not included in cost. The opportunity cost of reading Chapter 3 likewise does not include the price of the book, but it will vary with the lost opportunities incurred.

2. Do government-sponsored financial aid programs for college students influence the amount of education produced? Do these programs shift the production possibilities curve?

**Answer:** With government financial aid programs, more education is purchased than would have been without the program because the price of education has been lowered. These programs do not shift the production possibilities frontier because the additional resources used in education (from the subsidy) have been diverted from the production of other goods or services.

3. What does a movement along the production possibilities frontier suggest? What does a point inside the curve suggest?

**Answer:** A movement along the production possibilities frontier suggests that the economy is producing at its maximum output and that more of one good can be produced only by giving up more of the other good. A point inside the production possibilities frontier implies that more of one or both goods can be produced without giving up any of the other good.

4. A subsidy to farmers who purchase tractors and combines increases the production of this farm machinery. Does this cause an increase in the production possibilities curve or just a movement along the curve? Can subsidies cause economic growth?

**Answer:** The additional purchase of farm machinery results in a movement along the curve. In order to subsidize farmers, resources must be taken away from other projects, which lowers output in those industries. The curve does not move outward due to the subsidy. Subsidies can cause economic growth in an individual market but they cannot cause (initially at least) an increase in total economic growth. Subsidies may result in a misallocation of resources and therefore inhibit overall economic growth in an economy.

5. Why would a country with an absolute advantage in the production of all goods be willing to trade with other countries?

**Answer:** Although a country may have an absolute advantage in the production of all goods, it will still find trade beneficial because it will still have a comparative advantage in some goods and a comparative disadvantage in other goods.

6. Alpha can produce 60 bottles of wine or 40 pounds of cheese. Beta can produce 90 bottles of wine or 30 pounds of cheese. Both have constant costs of production. Draw their production possibilities curves. What is Alpha's cost of 1 bottle of wine? What is Beta's cost of 1 pound of cheese? If they trade, who should specialize in cheese?

**Answer:** Alpha's cost of one bottle of wine is  $\frac{2}{3}$  of a pound of cheese. Beta's cost of one pound of cheese is three bottles of wine. If trade took place, Alpha should produce cheese because it has the lowest opportunity cost of doing so.

7. What are the costs of going to college? Does the marginal benefit outweigh the marginal cost?

**Answer:** The cost of going to college includes tuition, room and board, and books as well as the earnings that could have been made by working instead of being a student.

For most students the marginal benefits are greater than the marginal cost of attending school because of the higher expected income stream that can be earned with a college degree.

8. Is the lost present consumption associated with the production of capital goods worth the benefit of the new capital?

**Answer:** If the future benefits from increasing the nation's capital stock are greater than the present cost of lost consumption, then the new capital is worth it.

9. Does Mexico have an absolute advantage over the United States in the production of textiles or just a comparative advantage?

**Answer:** Mexico definitely has a comparative advantage over the United States in textiles because that is what they specialize in and trade. The U.S. probably has an absolute advantage in the production of textiles.

10. Who is hurt by and who benefits from an import quota on foreign beef?

**Answer:** An import quota on foreign beef will hurt consumers of beef and producers of foreign beef. The quota will benefit domestic beef producers because they will receive a higher price for beef than they would have without the quota.

11. How does the cost of purchasing a loaf of bread at a supermarket compare with the cost of purchasing a loaf of bread at a convenience store?

**Answer:** The actual dollar cost of purchasing a loaf of bread might be higher in a convenience store, but if time costs for the individual are high, it may turn out to be cheaper to purchase the bread from the convenience store rather than stand in a long line at the supermarket.

12. What is the law of increasing costs and why does it hold?

**Answer:** As more scarce resources are used to produce additional units of one good, production of another good falls by larger and larger amounts. Resources are heterogeneous (not all alike) and are not perfectly adaptable to alternative uses.

13. When the gains from specialization and trade are assessed, exchange costs must be considered. What are these costs?

**Answer:** Exchange costs are all costs that are used to make and complete transactions including transactions costs, transportation costs, and artificial barriers to trade.

14. What happened to the production possibilities of Sri Lanka as a result of the December 2004 tsunami?

**Answer:** The tsunami destroyed a great deal of resources, both human and nonhuman. Any time resources are lost the production possibilities decrease. The production possibilities curve shifts in toward the origin.

**Answers to Problems**

1. Countries A and B both produce golf balls and golf clubs. At full employment the countries can produce the following:

A		B	
Golf Balls	Golf Clubs	Golf Balls	Golf Clubs
1200	0	900	0
1000	50	750	25
800	100	600	50
600	150	450	75
400	200	300	100
200	250	150	125
0	300	0	150

- (a) Graph the production possibilities curve of the two countries.  
 (b) Do both production functions exhibit constant costs?  
 (c) Who has the absolute advantage in both golf ball and golf club production?  
 (d) Who has the comparative advantage in the production of golf balls?  
 (e) Who has the comparative advantage in the production of golf clubs?

**Answers:**

- (a) The graph should display two separate straight-line curves with the quantities of golf balls on one axis and the quantity of golf clubs on the other. A's curve should intersect at 1200 on the golf ball axis and at 300 on the golf club axis. The intercepts for B should be 900 and 150 respectively.
- (b) The production possibilities curves should be straight lines and thus do show constant opportunity costs. In A, for each 50 unit increase in the production of golf clubs, a 200 unit drop in golf balls occurs. In B, for each 25 unit increase in the production of golf clubs, a 150 drop in golf balls occurs.
- (c) While A can produce more of both golf balls and golf clubs than B, we can not say whether A has an absolute advantage or not. The information given does not include the amounts of resources devoted to ball and club production in A or B—a necessary determinant of absolute advantage.
- (d) In A, 200 balls cost 50 clubs or 1 ball costs 1/4 club. In B, 150 balls cost 25 clubs or 1 ball costs 1/6 club. Since B's balls cost less, B has a comparative advantage in golf balls.
- (e) A's clubs costs 4 balls each while B's clubs cost 6 balls each. A's clubs cost less, thus A has a comparative advantage in clubs.
2. Consider the following data concerning the production possibilities of the countries Alpha and Beta.

Alpha		Beta	
X	Y	X	Y
0	20	0	60
20	15	10	45
40	10	20	30
60	5	30	15
80	0	40	0

- (a) Which commodity, X or Y, does Alpha have a comparative advantage in producing?  
 (b) Where does Beta's comparative advantage lie?  
 (c) Show the result in a graph.

**Answers:**

- (a) Alpha has a comparative advantage in X. One X costs  $1/4$  Y in Alpha and  $1\ 1/2$  Ys in Beta.  
 (b) Beta has a comparative advantage in Y. One Y costs  $2/3$  X in Beta and 4 Xs in Alpha.  
 (c) Alpha's production possibilities curve is a straight line from 20 Y on the vertical axis to 80 X on the horizontal and Beta's curve is a straight line from 60 Y to 40 X.

3. Consider the following production possibilities for the United States and France for two commodities, steel and concrete:  
 Which country has the comparative advantage in the production of concrete? Carefully explain why you believe your answer to be correct.  
 What would be the "loss" if both countries became self-sufficient and did not exchange?

**Answer:** France has the comparative advantage in the production of concrete because it can produce 4 times more concrete than steel with its resource endowment whereas the US can only produce twice as much.

Since the total output of the combined commodities would increase with specialization and would be lower without specialization and trade, one or, more likely, both countries would lose from self-sufficiency.

## ■ Beyond The Book

### Extra Problems

1. Suppose countries A and B have the following production possibilities:

x	0	20	40	60
A	-----			
y	75	50	25	0
x	0	30	60	90
B	-----			
y	120	80	40	0

- (a) Do each of these countries have constant cost of production?  
 (b) What does one y cost in A?  
 (c) What does one x cost in B?  
 (d) Can these countries gain from specialization and trade? Why?  
 (e) Which country has a comparative advantage in the production of y?  
 (f) If these countries trade, what will be the price of one x?
2. Suppose Beth and David agree to work together mowing and raking lawns to earn extra money. After a few days they discover that it takes Beth 2 hours to rake a 500 square foot area and 30 minutes to mow it. Also, it takes David  $2\ 1/2$  hours to rake 500 square feet and 45 minutes to mow it. Can they gain from specialization? Why or why not? According to comparative advantage, who should mow and who should rake?

**Answers:**

1. (a) Yes, each country's production possibilities curve forms a straight line frontier.  
 (b) In country A,  $60x = 75y$ , so 1 y costs 0.80 x and 1 x costs 1.25 y.  
 (c) In country B,  $90x = 120y$ , so 1 x costs 1.33 y and 1 y costs 0.75 x.  
 (d) Since the two countries have different opportunity costs, they can gain from specialization and trade.  
 (e) Because country B can produce y at a lower opportunity cost than A, B has a comparative advantage in y.  
 (f) If they trade, the terms of trade, or the price of 1 x, will be somewhere between 1.25 y and 1.33 y.
2. According to the data, in 1 hour of work Beth can rake 250 square feet or mow 1000 square feet; 1 raked square foot costs Beth 4 mowed square feet. In 1 hour David can rake 200 square feet or mow 666.67 square feet; 1 raked square foot costs David 3.33 mowed square feet. Since David's opportunity cost of raking is less than Beth's, the two can gain by allowing David to rake and Beth to mow.

**■ Essay Questions**

1. Suppose that all barriers to trade with the Soviet Union were lifted and the Soviet demand for U.S. wheat increased dramatically. Suppose that this increased demand resulted in a 100% increase in U.S. wheat production. Currently, wheat in the U.S. is primarily produced in the plains states. Where would the increased production be grown? Why? What would the wheat cost? Why?

**Answer:** Resources would be forced out of production of other goods and reallocated to the production of wheat. Primarily non-wheat agricultural products would be lost as land became employed in the production of wheat. The opportunity cost of wheat would rise as more is produced because the new land dedicated to wheat production would be less well suited for wheat production.

2. How does an individual producer, such as a farmer, know if he is producing the product in which he has a comparative advantage?

**Answer:** Individuals choose to produce products that will yield the greatest profits. By doing this, the owners of firms automatically produce the product in which they have a comparative advantage. By maximizing profit, the producer chooses the product that he can produce with the lowest relative cost or resource expenditure. If the producer can successfully compete (survive) within the face of both domestic and foreign producers then it must be the case that he has a comparative cost advantage.



### One Step Further

A. Numerical examples to illustrate production possibilities curves and comparative advantage are not as difficult as one may at first imagine. Here are some examples:

1. Constant cost production possibilities schedules are easy to obtain once you follow a simple rule. Let country A have the following production possibilities for goods x and y:

	x	0	a	2a	3a
A					
	y	3b	2b	b	0

This is a general form where a or b can take on any value. The opportunity cost of one x is always equal to  $b/a$  y and the opportunity cost of one y is always equal to  $a/b$  x. For example, if a equals 10 and b equals 20, then the production possibilities schedule for country A is:

	x	0	10	20	30
A					
	y	60	40	20	0

In this case one x costs 2 y and one y costs  $1/2$  x.

2. From example 1 it is easy to generate two constant cost production possibilities curves for two countries to illustrate comparative advantage. Let two countries A and B have the following general form production possibilities for goods x and y:

	x	0	a	2a	3a
A					
	y	3b	2b	b	0
	x	0	c	2c	3c
B					
	y	3d	2d	d	0

Since one x costs  $b/a$  y in A and one x costs  $d/c$  y in B, if  $b/a$  is greater than  $d/c$ , then B has a comparative advantage in x. If  $b/a$  is less than  $d/c$ , A has a comparative advantage in x. If  $b/a$  equals  $d/c$  then their opportunity costs are equal and there is no basis for trade. For example, let  $a = 10$ ,  $b = 20$ ,  $c = 15$ , and  $d = 10$ .

	x	0	10	20	30
A					
	y	60	40	20	0
	x	0	15	30	45
B					
	y	30	20	10	0

In A one x costs 2 y and in B one x costs  $2/3$  y. Since x costs less in B, B has a comparative advantage in x while A has a comparative advantage in y.

## Something to Think About

The *New York Times* article “Oil Could Clog Growth’s Motor” by Jonathan Fuerbringer, August 15, 2004 suggest that rising oil prices caused a decrease in the GDP growth rate. This chapter of the text book illustrates to the students that increases in the supplies of resources or improvements in technology increase production possibilities and decreases in the supply of resources, such as oil, cause decreases in productive capacities. The increases in oil prices reflect the decrease in the supply of oil and it is the decrease in the amount of oil not the increases in prices that cause the decrease in real GDP.

## Suggested Additional Readings

Alchian, A. A., “Cost”, in *Economic Forces at Work* (Indianapolis: Liberty Press, 1977).

Buchanan, J. M., *Cost and Choice* (Chicago: Markam, 1969).

Heilbroner, R. L., *The Making of Economic Society* (Englewood Cliffs, N.J.: Prentice-Hall, 1962), Chapter 1.

Krugman, P. R. and Obstfeld, M. *International Economics 7th ed.* (Addison Wesley, 2005)

Mundell, R. A., *Man and Economics* (New York: McGraw-Hill, 1968), Chapter 1.

Stigler, G. J., “The Division of Labor Is Limited by the Extent of the Market,” *Journal of Political Economy* 59 (June 1951), pp. 185–193.

## ■ Working with the Web

1. **Answer:** Each of the players listed plays only a single position of the nine positions that constitute a team. In other words, each player specializes in a particular position based on certain attributes such as a strong arm, speed, height, etc. Moreover, the division of labor among the nine positions on a team is likely to produce a better team result than if each player tried to rotate to a different position each inning.
2. **Answer:** Canada's level of exports to the United States (in thousands of dollars) of precious metal jewelry is \$192,409 while Italy's level of exports of precious metal jewelry is \$1,205,340. Hence Italy's level of exports relative to Canada's indicates that (given our assumptions) Italy has a comparative advantage in the production of precious metal jewelry for export to the U.S. in 2003. On the other hand, Canada has a comparative advantage in the production of household furniture relative to Italy in 2003, with the level of exports for Canada valued at \$1,240,398 compared to \$479,249 for Italy.
3. **Answer:** The productive capacity in each country will be reduced, at least for some time due to the broad devastation and loss of life as a result of the tsunami. The production possibilities frontier for each affected country would shift to the left to reflect this change.