

**Solution Manual for Principles of Macroeconomics 7th Edition  
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## ***Chapter 2: Production Possibilities and Opportunity Costs***

### **Chapter Outline**

Factors of Production

Labor

Capital

Land

Entrepreneurship

Robinson Crusoe's Production Possibilities

Opportunity Cost

The Law of Increasing Costs

Once Rich, It's Easy to Get Richer

Once Poor, It's Easy to Stay Poor

The Productive Power of Advanced Technology

The Indestructible Nature of Ideas

National Security, Conventional War, and Terrorism in the 21<sup>st</sup> Century

Possibilities, Impossibilities, and Less than Possibilities

Production Possibilities and Economic Specialization

Specialization on the Island

International Specialization

The Principle of Comparative Advantage

The Universality of the Production Possibilities Model

## **What the Chapter's About**

Opportunity cost, one of the most important concepts we teach in economics, is introduced in this chapter. As you know, it is the quantity of other goods that must be given

up to obtain a good. Discussion of opportunity cost leads directly to a discussion of the law of increasing costs. Why increasing costs? Because we assume that resources are of unequal quality. The economy's resources, a concept introduced in Chapter 1, is examined further here and recast into the four traditional factors of production: labor, land, capital, and entrepreneurship. These ideas are presented in the context of a two-goods production possibilities model with technological change shifting the production possibilities outward to the right. The discussion of technology emphasizes the importance of ideas. We live in a world where economic success or failure often depends on who innovates and who does not. Perhaps you can elaborate on the special attention paid to the importance of new ideas on economic activity. For example, note the importance of education and basic research on economic performance. You can mention the fact that the United States wins more Nobel prizes than any other country. Ultimately, the people who benefit most from these prizes are you and I. Analysis of technological change reappears in the chapter on supply and demand, shifting supply curves to the right, and again in the chapter on production costs, showing how an innovation lowers a firm's cost structures. Mention this to students so they know that these concepts are the bases for further analysis.

The chapter's analysis is presented in the form of a scenario, with a plot and set of characters. (I use a scenario format throughout the text.) We suppose an island economy with Robinson Crusoe dividing his labor between fishing and producing the capital needed to catch fish. The law of increasing costs is developed, but the analysis goes one step further. We show that once capital is produced, it makes it easier to produce even more capital later. And if capital isn't produced, it's awfully tough to produce more of anything later. This may be the first time students encounter a technical discussion of why nations grow.

Finally, specialization and division of labor are related to labor productivity. The greater the specialization and division of labor, the more productive are laborers. The text refers to Adam Smith's analysis of pin production. Think of other ways to express that idea. Show that it works for services as well as goods. How about surgery? The proficiency of the surgeon is related to the number of times the surgeon performs surgery. Ask the students whether they would prefer a first-time surgeon to someone who has practiced surgery countless times.

The section on national security, conventional war, and terrorism in the 21<sup>st</sup> century is a bold attempt to apply production possibilities analysis to these critical security issues we face as a society. The key idea here is that a nation's national security is not just a function of its own production of security goods but it also depends upon what security goods other nations produce. This idea complicates the straightforward use of the classic 'guns and butter trade-off' because a nation now can produce more security goods and still end up with no greater security and less of other things. It is more a realistic expression of the world we live in today and the analysis lends itself to much classroom discussion. As well, why some states support terrorism makes sense in the context of the production possibilities analysis discussed here.

If the benefits of specialization and division of labor accrue within an economy, shouldn't they accrue as well among different economies? That's how the chapter introduces the principle of comparative advantage. The distinction is made between absolute and comparative advantage. Tell students that this idea is at the heart of international trade analysis, which will be covered later in the course.

## Basic Economic Concepts

The four factors of production, **labor**, **land**, **capital**, and **entrepreneurship**, and **opportunity cost** and **the law of increasing costs** are discussed in the context of the **production possibilities model**. These concepts are used to develop the idea associated with a **full employment economy**, **unemployment**, **economic efficiency**, and **international economic specialization**. **Absolute** and **comparative advantage** explain the benefits we derive from international specialization.

## Using the *Economic Consultants* Feature

You can turn the *Economic Consultants* feature in this chapter into an assigned project for the class. Each student can prepare a report on the mineral water industry, or specific segments of the topic can be assigned to a student or group of students to create a collective project for the class. It allows the student to get into the particulars of that industry and focus on division of labor and specialization analysis. The project can also include an analysis of the economy of Russia. The Web sites take the student in both directions.

## Answers to Text Questions

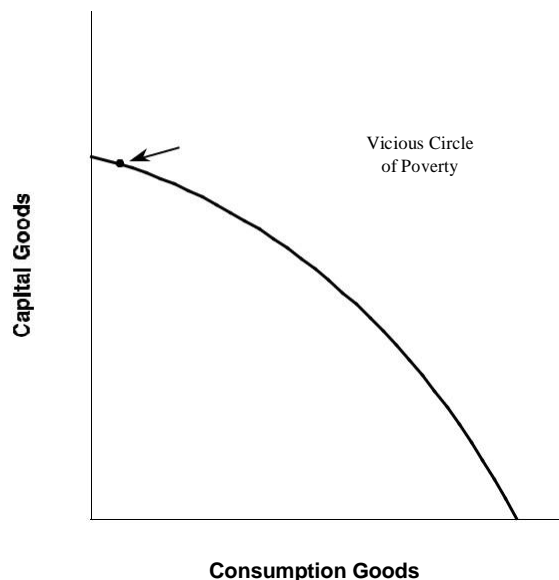
1. Entrepreneurs assume the uncertainties of enterprise. They buy, lease, or hire other factors of production—land, labor, capital—in the *expectation* that the goods they produce will generate a total revenue greater than the total costs incurred in buying, leasing, or hiring the factors. The emphasis is placed on *expectation*. It describes the future. Entrepreneurs have no guarantee that the goods they produce *will* in fact generate the *expected* revenue. It depends on the prices of the goods when they finally reach the market. Entrepreneurs have expectations as well about their production costs. Can they in fact produce the expected quantity of goods with the factors of production bought, leased, or hired? Entrepreneurs live in a world of uncertainty and must accept the rewards or losses when their expectations are realized or unrealized. Suppliers of labor, land, and capital, on the other hand, provide entrepreneurs with labor, land, and capital at *prior-to-production*, *agreed-upon* wages, rents, and interest rates.
2. If the automobile is used as a taxi. A taxi is a good used to produce another good: *transportation*. By definition, then, the taxi is a capital good. The distinction between a capital good and consumption good depends on function and purpose. A violin, played by a nonprofessional who enjoys music, is a consumption good. That same violin, played by a concert-hall violinist, is a capital good. The violin is used to produce another good: *entertainment*. A tuxedo worn by a groom at his wedding is a consumption good. An identical tuxedo worn by waiter at a fashionable restaurant is a capital good. If you use your truck to go to the movies, it's a consumption good.
3. If a long-distance truck driver had no truck, it would be difficult, if not impossible, for the driver to transport a refrigerator from Miami to Los Angeles. The truck is the

driver's capital. If a person has no degree in engineering, it would be impossible for the person to work as an engineer. Like the truck, the engineering degree is a capital good: It is used to produce an engineering product. Because the degree, unlike the truck, is not physical but is part of the person—as is all education and experience—it is identified as human capital. When is education not human capital? When it's used for pure enjoyment. Taking a course in economics without thinking of using the information for professional reasons—just for sheer enjoyment—makes the economics course a consumption good.

4. Consider this: It takes fewer resources—land, capital, and labor—to produce a pound of coffee in Brazil than it does in the United States. Brazil, then, has an absolute advantage vis-à-vis the United States in producing coffee. Now let's suppose Brazil uses fewer resources to produce both coffee and automobiles than the U.S. uses. And suppose the U.S. uses twice the resources Brazil does to produce automobiles and ten times the resources Brazil uses to produce coffee. Even though the U.S. uses more resources to produce automobiles than Brazil does, the U.S. has a comparative advantage over Brazil in auto production because the opportunity cost of producing automobiles in the U.S. is lower.
5. The law of increasing (opportunity) costs states that the cost of producing each additional unit of a good increases as more of that good is produced. Resources are not of equal quality or fertility. No all labor is alike, not all land is alike. This is the premise to increasing cost. As we produce more of one good, more resources are required to produce each additional unit. As successively less well-suited resources are used, more of them have to be used, therefore costs rise.
6. Keep in mind the law of increasing costs. Each time we produce more of one good, we have to give up an increasing quantity of other goods. If we apply it to clean air, the more clean air we produce—purifying the air from, say, 70 percent clean to 80 percent clean—each additional percent requires us to give up increasingly more of other goods. Suppose we consider increasing our clean air production from 90 percent pure to 91 percent pure. That additional percent can cost us so much of other goods that we end up choosing not to produce it. In other words, we may say we want less pollution, but the truth of the matter is that, given our options, we choose to live with some pollution because the opportunity cost of the cleaner air is simply too high.
7. Once you invent the wheel, you can destroy it, but the know-how still remains intact in your mind. As long as there is a mind to protect an idea, the idea thrives. Ideas, including those in the form of technical knowledge, can be passed on from one person to others through observation, formal education, and learning-by-practice so that, widely spread, they become virtually indestructible.
8. I would recommend that Egypt shift some of its resources out of the production of consumption goods to the production of capital goods. I would also recommend that Egypt undertake long-term investment in education. Building the nation's capital stock and investing in human capital are the surest way of climbing out of national poverty. I would expect resistance to such policies because the immediate consequences of diverting resources from consumption goods to capital goods production

is trading consumption now for the prospects of more consumption later. Poor people cannot live on prospects, however attractive they may be.

9. It's a matter of China moving from one point on its production possibilities curve to another: less consumption goods and more capital goods production. Most children consume and do not produce. Fewer children mean less consumption goods needed. China takes those resources that had been used to produce consumption goods for children and applies them to the production of capital goods. With more capital goods produced today, tomorrow's resources are greater—capital is a resource—and this is reflected in tomorrow's outward shift of the production possibilities curve.
10. Loss of resources, such as a flood that destroys cultivatable lands, a fire that destroys forests, or a war that devastates whole cities and people, could cause an inward shift. With fewer resources, a society produces less.
11. The curve bows out because the law of increasing costs assumes that resources are of unequal quality and fertility. If resources were of equal quality and fertility, the production possibilities curve would be a straight line.
12. Silence. That's what's given up. And sometimes it's at great cost.
13. What you consume yourself, you can't sell. If the Danes consume their own butter, they can't sell it. So by consuming butter, they lose the goods they could have bought with the butter sales. But they didn't consume the butter. They consumed margarine instead. By consuming margarine, they signal that the opportunity cost of consuming their own butter was too high. It makes good sense to the Danes and to everybody else who understands the concept of opportunity cost.
14. In many poor economies, people must use all their resources to produce basic consumption goods just to feed themselves. As a result, they produce little, if any, capital goods. And because they don't produce capital goods, they remain poor. See the exhibit below.

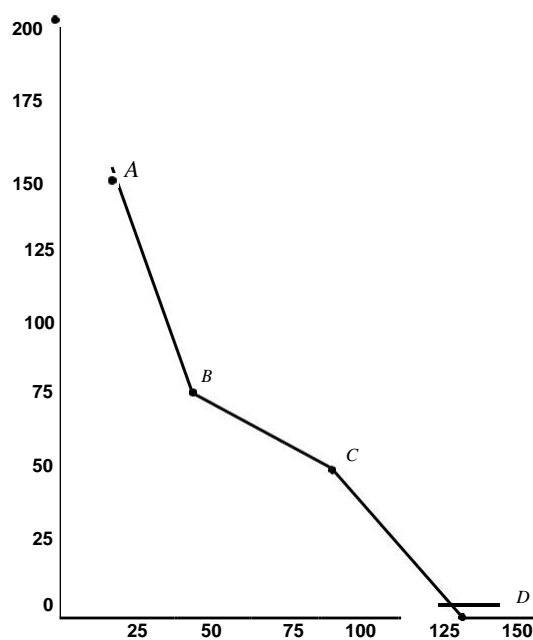


15. If immigration is allowed, the quantity of labor in the economy increases, which shifts the production possibilities curve out to the right. That creates economic growth, which is good. No, say opponents of immigration. Not necessarily for *everybody!* With more mouths to feed, it creates a movement along the production possibilities curve from capital goods to consumption goods production so that there are fewer consumption goods per person. Immigration can actually reduce the people's standard of living.



## Answers to Practice Problems

1. Try 26. To satisfy the law of increasing costs, the number must fall within the 20 to 29 range in such a way that the difference between it and 19 (from set B to C) is greater than the difference between it and 30 (from set C to D).
2. It violates the law of increasing costs because by giving up 50 bushels of grapefruit—going from 150 to 100 bushels—you can increase orange production by  $40 - 19 = 21$  bushels. Giving up an additional 50 bushels of grapefruit—going from 100 to 50 bushels—you can increase orange production by  $80 - 40 = 40$  bushels. In other words, you are experiencing decreasing costs (measured in forfeited grapefruit) as you add to your orange production. See the exhibit below.



3. This question is a little tricky. Instead of giving you the number of goods produced in a day, the table shows the number of hours it takes to produce a unit of goods. By giving up the 5 hours needed to produce a peach crop, Florida can use those 5 hours to produce an orange crop. Now let's look at Georgia. By giving up the 4 hours needed to produce a peach crop, Georgia can use those 4 hours to produce two orange crops. The opportunity cost to Georgia, then, of producing a peach crop is two orange crops, or twice Florida's opportunity cost. Result: Georgia should specialize in oranges and Florida in peaches. Just the opposite of what you thought the results would be, right?
4. The most likely possibilities are B and C. If A is chosen, no capital goods are produced so the production possibilities curve does not shift outward. What about D? Unreasonable. After all, you can't live with zero consumption. See the following exhibit.

5.