# *Economics for Today 10th edition Tucker Solutions Manual*

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# *Chapter* 2
# Production Possibilities, Opportunity Cost, and Economic Growth

## CHAPTER SUMMARY

The *What*, *How* and *For Whom* questions are introduced as the fundamental economic questions that must be addressed by all societies. Because any nation's resources are scarce and its wants are unlimited then all nations are faced with scarcity. Therefore, we must all try to do the best with what we have---to maximize production given limited resources. This is shown in terms of the production possibilities model. There are only two general types of products which can be produced. These are consumer and capital products. Consumer products satisfy our wants directly and in the present. Capital products satisfy our wants indirectly and in the future. If we are efficient with our use of resources then we are producing a combination of consumer and capital products shown by a point on the production possibilities curve. Inefficiency is shown by a point inside the curve. A point outside is a combination of output which is currently unobtainable. However, the greater the investment in capital production, then the greater the rate of economic growth and therefore the larger the rightward shifts of the production possibilities curve and the sooner the nation will be able to produce any point which is currently outside its curve. But, the opportunity cost of greater rates of economic growth over time is foregone consumer goods production today, and therefore current satisfaction.

Indeed, there is an increasing opportunity cost associated with producing ever larger quantities of any one good. Marginal analysis enables us to make more rational decisions by concentrating on the marginal, or extra, benefits and costs associated with a decision to see if that activity or good "is worth it."

## NEW CONCEPTS INTRODUCED

*What*, *How* and *For Whom* Questions
investment
production possibilities curve
marginal analysis
opportunity cost
technology
law of increasing opportunity cost
economic growth

## LEARNING OBJECTIVES

*After completing this chapter, you should be able to:*

1. Explain the three fundamental economic questions.
2. Explain opportunity cost using examples..
3. Explain marginal analysis using examples.
4. Understand a production possibilities curve.
5. Illustrate economic growth using a production possibilities curve.
6. Define investment.

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## CHAPTER OUTLINE

2-1 Three Fundamental Economic Questions
- a. What To Produce?
- b. How To Produce?
- c. For Whom To Produce?

2-2 Opportunity Cost

**Exhibit 1 "The Links between Scarcity, Choice, and Opportunity Cost"**

2-3 Marginal Analysis

2-4 The Production Possibilities Curve

**Exhibit 2 "The Production Possibilities Curve for Military Goods and Consumer Goods"**

2-5 The Law of Increasing Opportunity Costs

**Exhibit 3 "The Law of Increasing Opportunity Costs"**

2-6 Sources of Economic Growth
- a. Changes in Resources
- b. Technological Change

**Exhibit 4 "An Outward Shift of the Production Possibilities Curve for Computers and Pizzas"**

*Checkpoint:* *"What Does a War of Terrorism Really Mean?"*

*You're The Economist: Analyze the Issue*
*"FedEx Wasn't an Overnight Success" Applicable Concept: Entrepreneurship.*

2-7 Present Investment and Future Production Possibilities Curve

**Exhibit 5 "Alpha's and Beta's Present and Future Production Possibilities Curves"**

*Global Economics: Analyze the Issue*
*"How Does Public Capital Affect a Nation's Curve?" Applicable Concept: Economic Growth.*

Summary of Conclusion Statements
- a. Scarcity limits an economy to points on or below its production possibilities curve.
- b. The production possibilities curve consists of all efficient output combinations where an economy can produce more of one good only by producing less of the other good.
- c. Because resources are not equally well suited to producing all products, it's common to experience increasing opportunity costs and a bowed-out shaped production possibilities curve.
- d. A nation can accelerate economic growth by increasing its production of capital goods in excess of the capital being worn out in the production process.

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**HINTS FOR EFFECTIVE TEACHING**

1. Some instructors prefer to teach comparative advantage with the concepts in this chapter. These instructors should assign the first few pages of Chapter 28 which covers this topic.

2. You may want to elaborate on the three fundamental economic questions (*"How?", "What?"* and *"For Whom?"*) which any society must address. These fundamental questions are related to the desire to maximize production, to produce a combination of products most desired by society, and to distribute products in some equitable manner. All nations have to grapple with these issues as a result of scarcity. You may have alluded to this in the first chapter. You may want to ask students what they think the answers are to these questions. In the process point out that in a capitalist system consumer demand (sovereignty) predominately determines what gets produced. The "How" question is predominately answered by businesses when they determine the resource mix used in the production process subject to their desire to limit their costs and to maximize their profits. For whom goods and services are produced is largely determined by the distribution of income. If you have more money you get more goods and services.

   Moreover, you may want to reiterate that social and political forces, in addition to economic forces also help to determine the answers to the fundamental economic questions. Ask students to provide examples of how social and political forces can impact these fundamental economic questions.

3. Because opportunity cost is such a fundamental economic concept you should make sure that students understand what it is through the use of several examples. Ask them what their opportunity cost is for being in class today.

4. Point out that opportunity costs are associated with *every* decision. Sometimes they are not so obvious--they are often implicit costs.

5. Point out that *all* costs are opportunity costs. *Note that opportunity costs cannot always be measured in dollars and cents.*

6. You may wish to elaborate on marginal analysis, which is at the heart of *rational* decision making. Note that if the marginal benefits exceed the marginal costs of a decision, then it is rational to do more of that activity because "it's worth it"---you are adding more in benefits than in costs; and vice versa. Point out, however, that benefits and costs of a decision are not always clear. You don't always know what they are going to be. Moreover, they may not be easily measured or quantified. Instead, they often must be subjectively estimated. Therefore, what may appear as rational to one person may not appear as rational to someone else because of the different subjective estimates of benefits and costs.

   After discussing a consumption decision, you may want to drive the point home by pointing out that reasonable people can disagree over whether government involvement in a particular situation is "worth it" or not, because of their differing subjective measures of the benefits and costs associated with that government involvement.

7. Stress that all nations attempt to produce on their production possibilities curves---to maximize production given their limited resources. To do so will require employing all their resources. This is why *full employment is a universal national economic (macroeconomic) goal.* Because full employment *is illustrated as a point on the curve*, then all nations attempt to be on their production possibilities curves. If some unemployment and/or underemployment is experienced, then it is illustrated as a combination of output shown by a point inside the curve.

   A point outside the curve is *currently* unattainable. However, with enough economic growth that combination of consumer and capital products may be feasible.

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8. In terms of the production possibilities model, stress that there are only two general types of products which can be produced---consumer and capital products. Consumer products satisfy our wants directly and in the present. Capital products satisfy our wants indirectly and in the future. It may appear tempting to produce a lot of consumer products now because this will satisfy us more now. However, the opportunity cost is fewer capital goods production which is necessary for future growth. (Explain that investment in capital goods will increase future production possibilities because workers are more productive the more plant and equipment they have to work with. Emphasize that greater growth is illustrated as a rightward shift of the production possibilities curve.) Therefore, if we choose a lot of consumer goods production now it will be at the expense of not so much later on. In short, *our present location on the production possibilities curve will determine the future location of the curve.*

   Moreover, emphasize that *economic growth is another one of the three major macroeconomic goals.* It is a major macroeconomic goal because it increases the size of the "economic pie." Assuming no change in the distribution of income, growth ensures that everyone gets "a bigger piece of the pie." Otherwise stated, *economic growth is desired because it increases the nation's average absolute standard of living.* But, higher standards of living require the sacrifice of current consumption in order to free up resources to be devoted to the production of capital products. *We need less consumption and more investment for greater growth and higher standards of living.*

## CRITICAL THINKING/GROUP DISCUSSION QUESTIONS

1. How does government affect the answer to the "What" fundamental economic question?
   *Whenever it taxes or spends money, or when it bans the production of some products...*
2. How does government affect the answer to the "How" fundamental economic question?
   *By setting government standards and regulatory guidelines...*
3. How does government affect the answer to the "For Whom" fundamental economic question?
   *By redistributing income via the personal income tax system...*
4. What is the opportunity cost of attending college?
   *The foregone income which could have been earned working full time.*
5. What is the cost of a new car?
   *The amount of other goods and services which could have been purchased but now must be given up.*
6. What is the profit-maximizing quantity of output for a firm to produce?
   *That output in which the marginal benefits from production no longer exceed the marginal cost (where MR = MC).*
7. Under what conditions would a nation be able to *currently* produce more of both consumer and capital products?
   *If production is currently occurring at a point inside its production possibilities curve---if there is currently some unemployment and/or underemployment.*
8. What are the necessary ingredients for a nation to experience greater rates of economic growth, higher average standards of living, and a greater ability to compete in the global economy? That is, what could the U.S. do to achieve all this?
   *Need: 1) investment in private capital; 2) investment in public capital (infrastructure); 3) investment in human capital---people (e.g. education); 4) growth in technology; 5) entrepreneurship; 6) stable political environment.*
9. What are some problems associated with economic growth?
   *Environmental problems...Note, one needs to weigh the benefits against the costs to determine whether more growth is worth it.*

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**CLASSROOM GAMES**

Approximately 170 non-computerized economic games (experiments) for use in the classroom are available for free at http://www.marietta.edu/~delemeeg/games/. The following games are recommended to help teach some of the concepts in this chapter:

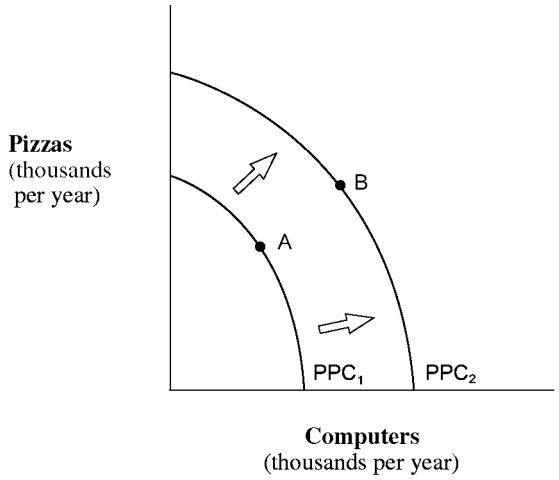
*Game #107*—Objective: To illustrate a production process subject to diminishing returns and illustrate the construction of a production possibilities frontier.
*Games #117*— Objective: To illustrate the impact of specialization of resources on the construction of a production possibilities frontier.

**ANSWERS TO: *"You're the Economist" and "Global Economics:" "Analyze the Issue"***

**FEDEX WASN'T AN OVERNIGHT SUCCESS**

Draw a production possibilities curve for an economy producing only pizzas and computers. Explain how Fred Smith and other entrepreneurs affect the curve.

*Suppose the economy produces only pizzas and computers at point A on the production possibilities curve $PPC_1$. Holding all other factors constant, the impact of an entrepreneur is to shift the curve outward to $PPC_2$. The reason is that the entrepreneur provides a new way to produce more output with the same resources and technology. In the case of Fred Smith, overnight mail service speeded up the delivery of vital parts and communications needed to operate businesses. As a result, the economy can move from point A to point B and produce more pizzas and computers in the same period of time.*




**HOW DOES PUBLIC CAPITAL AFFECT A NATION'S CURVE?**

Construct a production possibilities curve for a hypothetical country. Put public capital goods per year on the vertical axis and consumer goods per year on the horizontal axis. Not shown directly in your graph, assume that this country produces just enough private capital per year to replace its depreciated capital. Assume further that this country is without public capital and is operating at point A where consumer goods are at a maximum. Based on the above research and using a production possibilities curve show and explain what happens to this country's private capital, production possibilities curve, and standard of living if it increases its output of public capital.

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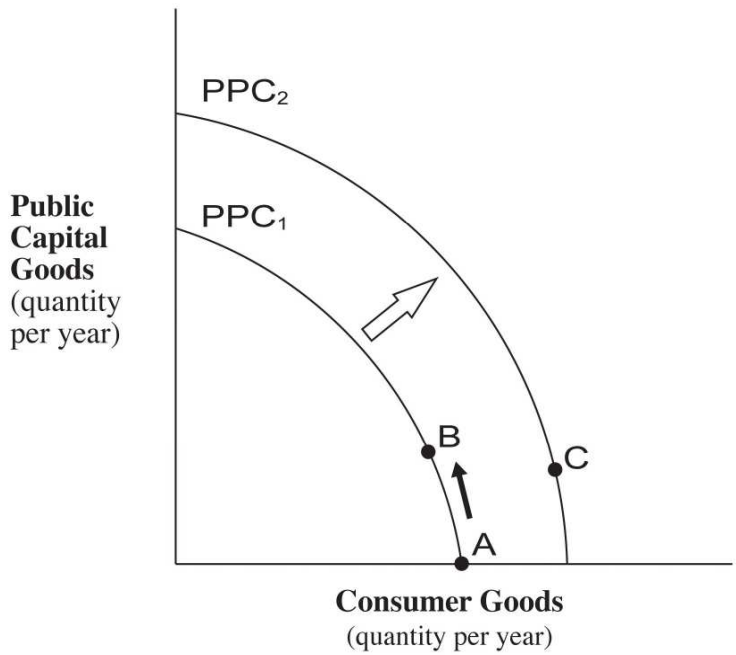
*At point A, this country's production possibilities curve will remain at $PPC_1$ and achieve no growth because its private capital output only replaces its depreciated capital used to produce consumer goods. Now assume an increase in public capital goods output as a tradeoff for less output of consumer goods, as shown as movement from point A to point B. The predicted result would be an increase in the production of new private capital stock because of the benefits from infrastructure. Since private capital output increases, the economy grows from $PPC_1$ to $PPC_2$ and the standard of living rises because this country can produce greater consumer goods per year at point C on $PPC_2$.*




**ANSWERS TO EVEN-NUMBERED *"Study Questions and Problems"***

2. *The cost of the car is independent of the price charged for the car. The true cost is the opportunity cost of producing it. For example, the same resources could have been used to produce a truck for the military.*

4. *Decision (a) produces the greatest opportunity cost because the alternative use of a lot in Tokyo is much more valuable than the use of a square mile of desert.*

6. *See the figure below.*

   *(a) (Points A-B) 1 thousand tons of beef, (Points D-E) 4 thousand tons of beef, and (Points B-A) 2 thousand automobiles.*

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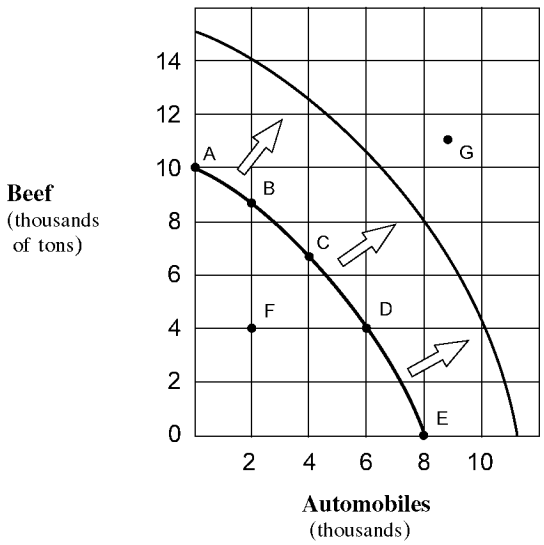


(b) *Point F is an inefficient point because it is possible to produce either more automobiles or more beef without producing less of the other output. Point G is impossible to produce, given the definition of the production possibilities curve as the maximum combinations that can be produced with existing resources and technology. Points A through E are efficient because more of one of the products can be produced only by incurring an opportunity cost in terms of the other product.*

(c) *The law of increasing costs is reflected. Moving from the origin along the horizontal axis, each 2 thousand unit increase in the output of automobiles results in greater declines in beef production, measured along the vertical axis. Beef declines (in thousands of units) between points A-B, B-C, C-D, and D-E are -1, -2, -3, and -4, respectively. These values reflect the changing slope that determines the bowed-outward shape of the production possibilities curve.*

(d) *Any one of the four factors of production could be increased or improved, and this would expand the economy's production capacity. An advance in technology would also shift the curve outward. A decline in the quantity or the quality of resources would shift the production curve to the left. Students should be able to translate a 50 percent increase in the production combinations into their graph.*

8. *The production possibilities curve is convex, or bowed out from the origin, because of the law of increasing costs. This law states that resources are not perfectly interchangeable from production of one type of output to another.*

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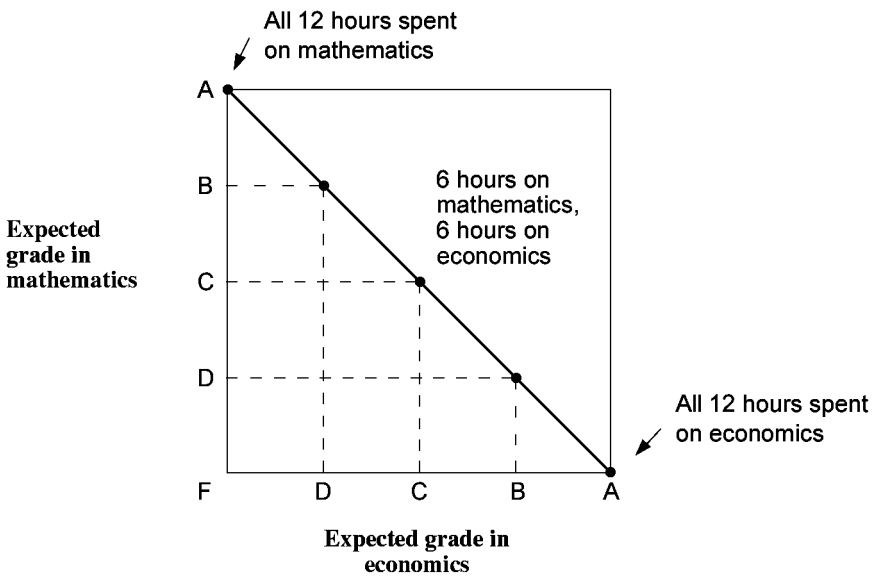
10. (a) **Maximum Production Possibilities for Expected Grades in Mathematics and Economics**

| *Number of hours studied* | *Expected grade in economics* | *Number of hours studied* | *Expected grade in mathematics* |
|---|---|---|---|
| *0* | *F* | *12* | *A* |
| *3* | *D* | *9* | *B* |
| *6* | *C* | *6* | *C* |
| *9* | *B* | *3* | *D* |
| *12* | *A* | *0* | *F* |

(b) Figure 2A-2




*One assumption is that the number of hours does not vary. Another is that the student has correctly determined that there is a one-to-one trade off. One letter grade in economics is always exchanged for one letter grade in mathematics.*

*(c) The curve is not bowed outward and, instead, is a downward-sloping straight line reflecting constant opportunity costs. Selecting any of the output combinations requires shifting 3 hours study time from one subject to another. Each change in 3 hours of study time reflects a constant slope of one letter grade gain for one letter grade loss.*

12. *Investment is the act of increasing an economy's stock of capital. This process means that an economy is replacing worn-out capital and producing a net gain in new factories, equipment, and other capital goods that increase the productivity of the other factors of production. The increased quantity of capital results in additional capacity of the economy to produce goods and services. Thus, the production possibilities curve shifts rightward, and economic growth is achieved.*

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## CHAPTER 2 SUMMARY QUIZ

1. Which of the following statements is true?
   a. An opportunity cost is what must be given up in order to get something else.
   b. The three fundamental economic questions refer to What to produce? How to produce? and When to produce?
   c. The term "investment" refers to the purchase of stocks and bonds and other financial securities.
   d. The law of increasing opportunity cost implies that as production of one type of good is expanded then fewer and fewer of other goods must be given up.

2. Which of the following statements is *false*?
   a. Marginal analysis is an examination of the effects of additions or subtractions from a current situation.
   b. The production possibilities curve shows the maximum combination of two outputs that an economy can produce, given its available resources and technology.
   c. Technology is the body of knowledge and skills applied to how goods are produced.
   d. Economic growth is illustrated as an inward shift of the production possibilities curve.

3. Given a production possibilities curve, a point:
   a. inside the curve represents unemployment.
   b. on the curve represents full employment.
   c. outside the curve is currently unattainable.
   d. all of the above.

4. A rightward (an outward) shift of a nation's production possibilities curve could be caused by:
   a. a decrease in technology.
   b. an increase in resources.
   c. producing more consumer and fewer capital goods.
   d. a decline in the labor force's level of education and skills.

## ANSWERS TO CHAPTER 2 SUMMARY QUIZ

1. a
2. d
3. d
4. b

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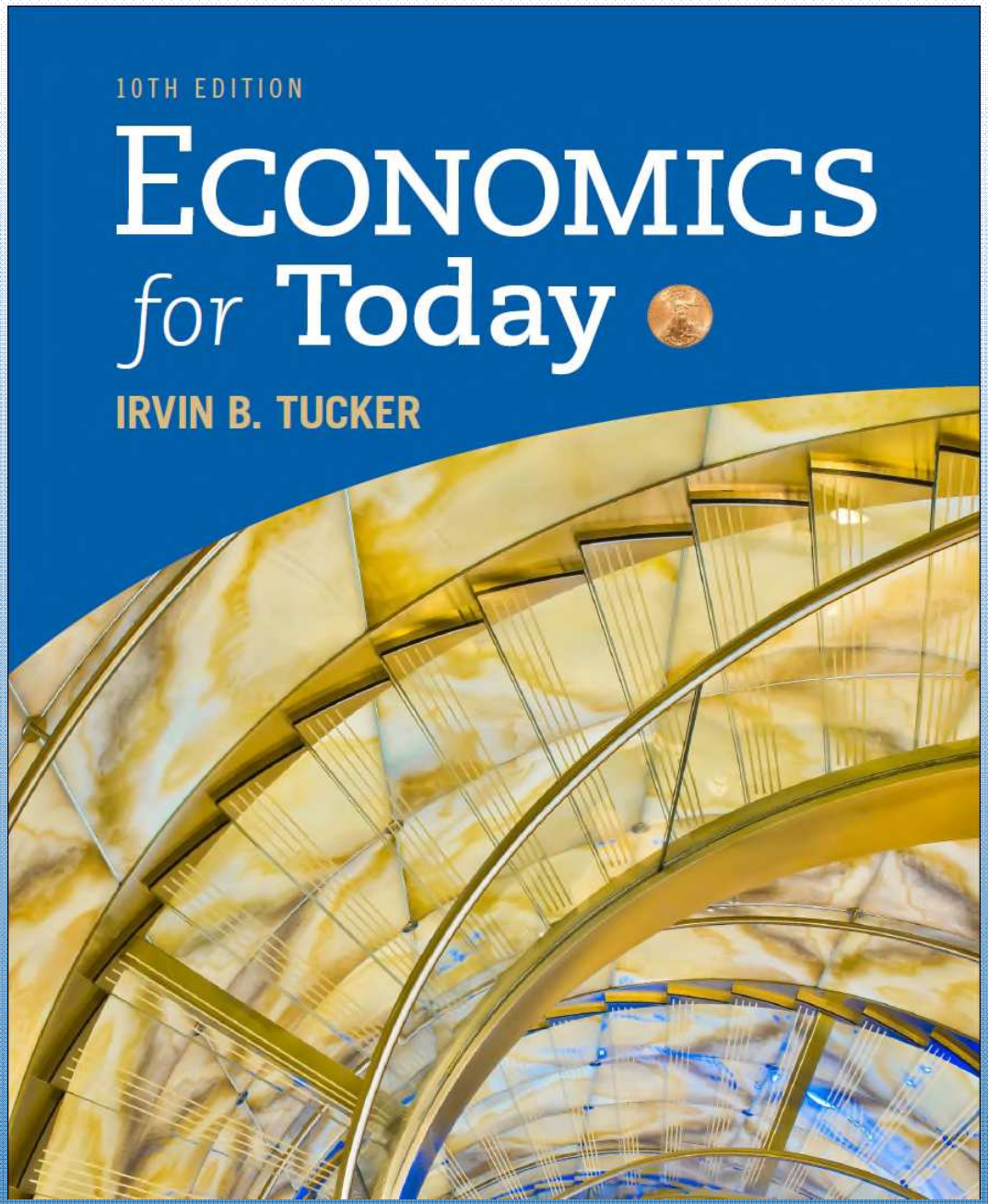


# CHAPTER 2

# Production Possibilities, Opportunity Cost, and Economic Growth

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# What will I learn in this chapter?

- The three basic choices that people make: *What*, *How*, and *For Whom* to produce
  - Opportunity cost
  - Marginal analysis
- How the production possibilities curve teaches many of the most important concepts in economics, including scarcity, the law of increasing opportunity costs, efficiency, investment, and economic growth

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# What are the three fundamental economic questions?

1. *What* to produce?
2. *How* to produce?
3. *For Whom* to produce?

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# What does each question address?

1. The *What* question asks exactly which goods are produced and in what quantities.
2. The *How* question requires society to decide the resource mix used to produce goods.
3. The *For Whom* problem concerns the division of limited output among society's unlimited wants.


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# What is opportunity cost?

The best alternative sacrificed for a chosen alternative

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# How is opportunity cost measured?

The highest-valued good or use of time given up for the chosen good or use of time measures the opportunity cost.

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# EXAMPLE OF OPPORTUNITY COST

What would you be doing if you were not studying these slides?

If your answer is sleeping, then the opportunity cost of studying these slides is the sleep you sacrifice.


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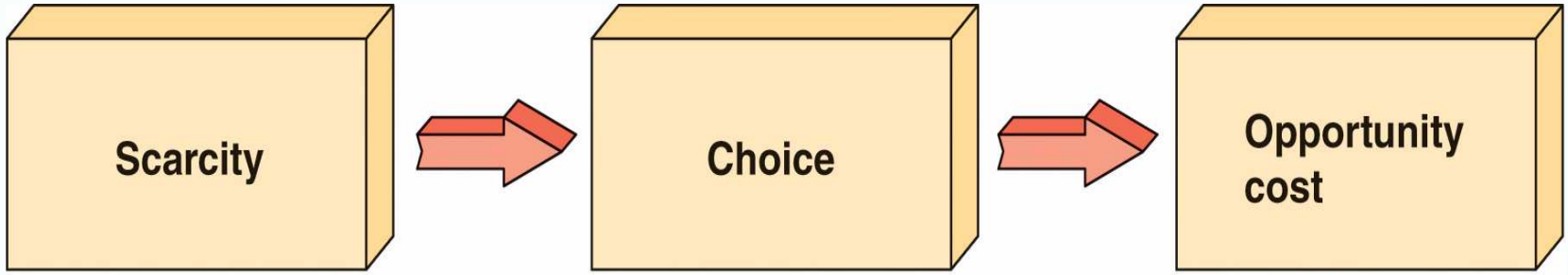
# **EXHIBIT 1** The Links between Scarcity, Choice, and Opportunity Cost

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# What is marginal analysis?

An examination of the effects of additions to or subtractions from a current situation

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# EXAMPLE OF MARGINAL ANALYSIS

Should you devote an extra hour to studying these slides or sleeping?

If you decide the benefit of a higher grade in economics exceeds the opportunity cost of sleep, then you allocate the extra hour to studying these slides.


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# What is the production possibilities curve?

A curve that shows the maximum combinations of two outputs an economy can produce in a given period of time with its available resources and technology


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# What are the three basic assumptions that underlie the production possibilities curve?

1. All resources are fully employed.
2. The resource base is not allowed to vary during the time period.
3. Technology remains constant.


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# What is technology?

The body of knowledge applied to how goods are produced

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# **EXHIBIT 2** Production Possibilities Schedule for Military and Consumer Goods per Year

| **Output** | **Production Possibilities** | | | |
|---|---|---|---|---|
| **(billions of units per year)** | **A** | **B** | **C** | **D** |
| Military goods | 160 | 140 | 80 | 0 |
| Consumer goods | 0 | 40 | 80 | 100 |

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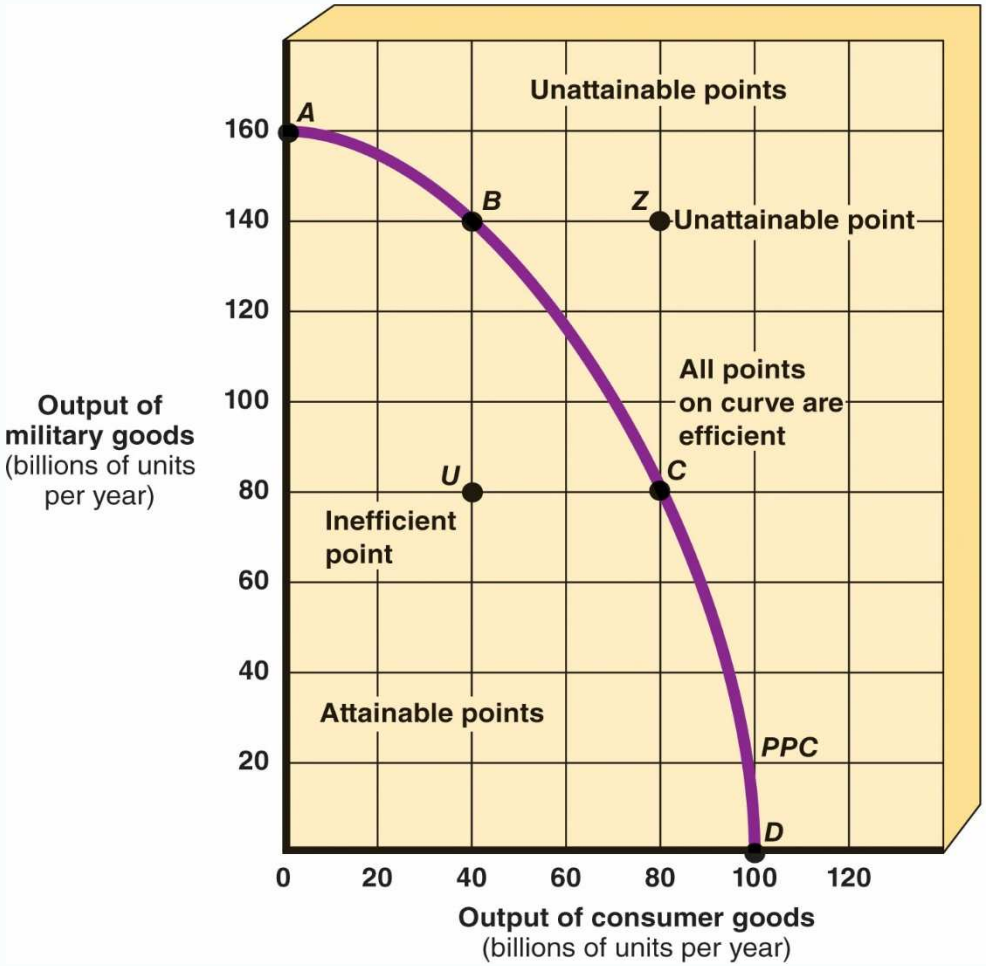
# **EXHIBIT 2** The Production Possibilities Curve for Military Goods and Consumer Goods

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# What is an efficient point?

Any point along the production possibilities curve because each point represents a maximum output possibility

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# What is an inefficient point?

Any point inside the production possibilities curve due to an economy operating without all its resources fully employed

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# What is an attainable point?

Any point inside or along the production possibilities curve because it can be achieved with the economy's present production capabilities

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# What is an unattainable point?

Any point outside the production possibilities curve because it is beyond the economy's present production capabilities, even when it is operating with all its resources fully employed


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# What conclusion can we make regarding scarcity and the production possibilities curve?

Scarcity limits an economy to points on or below its production possibilities curve.


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# What conclusion can we make regarding the production possibilities curve?

The production possibilities curve consists of all efficient output combinations at which an economy can produce more of one good only by producing less of the other good.


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# What is the law of increasing opportunity costs?

The principle that the opportunity cost increases as production of one output expands

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# **EXHIBIT 3** Production Possibilities Schedule for Tanks and Sailboats per Year

| **Output** | **Production Possibilities** | | | |
|---|---|---|---|---|
| **(thousands per year)** | **A** | **B** | **C** | **D** |
| Tanks | 80 | 70 | 50 | 0 |
| Sailboats | 0 | 20 | 40 | 60 |

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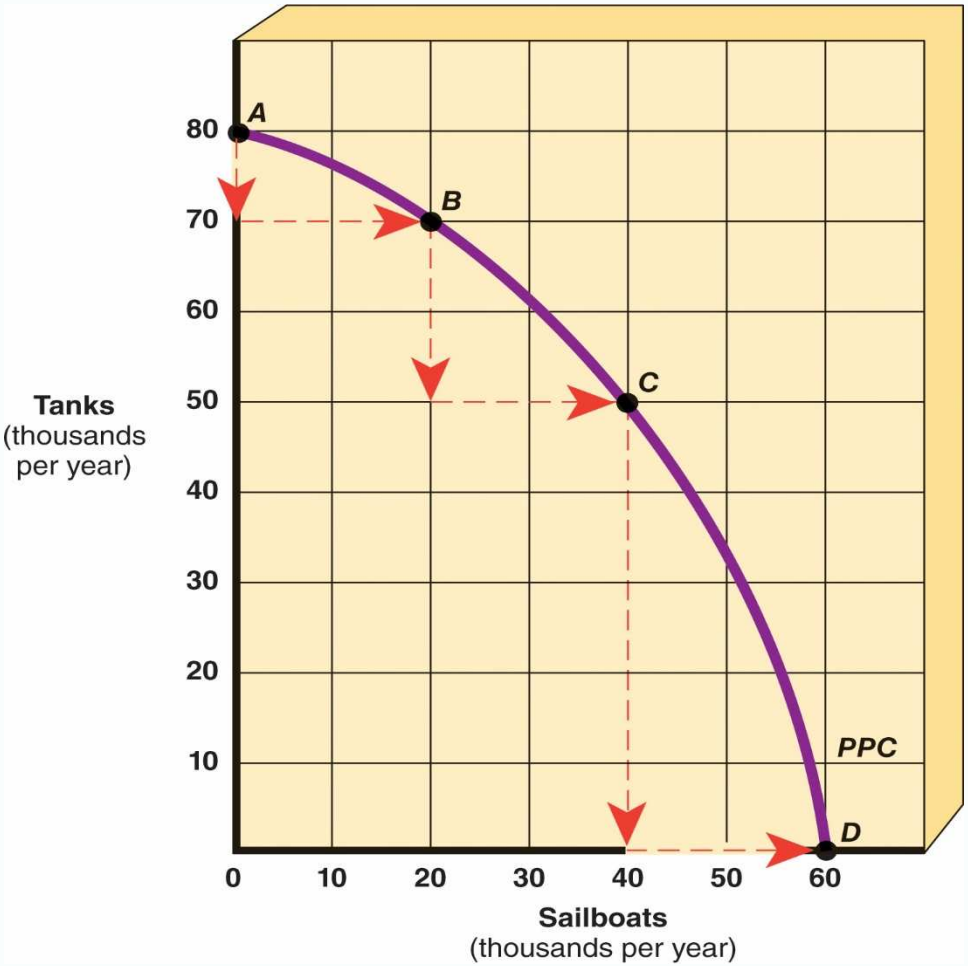
# **EXHIBIT 3** The Law of Increasing Opportunity Costs

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# What conclusion can we make regarding the law of increasing opportunity costs?

Because resources are not equally well-suited to producing all products, it's common to experience increasing opportunity costs and a bowed-out production possibilities curve.


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# What is economic growth?

The ability of an economy to produce greater levels of output, represented by an outward shift of its production possibilities curve

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# What are ways to achieve economic growth?

- An increase in resources
- An advance in technology

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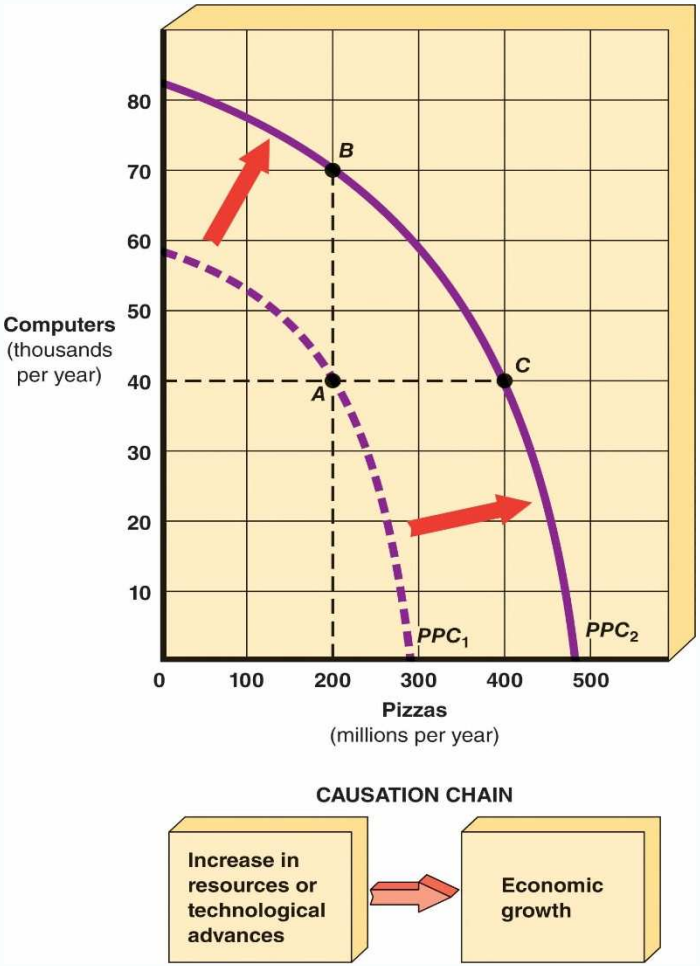
# **EXHIBIT 4** An Outward Shift of the Production Possibilities Curve for Computers and Pizza

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# What is investment?

The accumulation of capital, such as factories, machines, and inventories, used to produce goods and services

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# What is the opportunity cost of investment?

A country must decide how to allocate its resources between producing capital goods and consumer goods.


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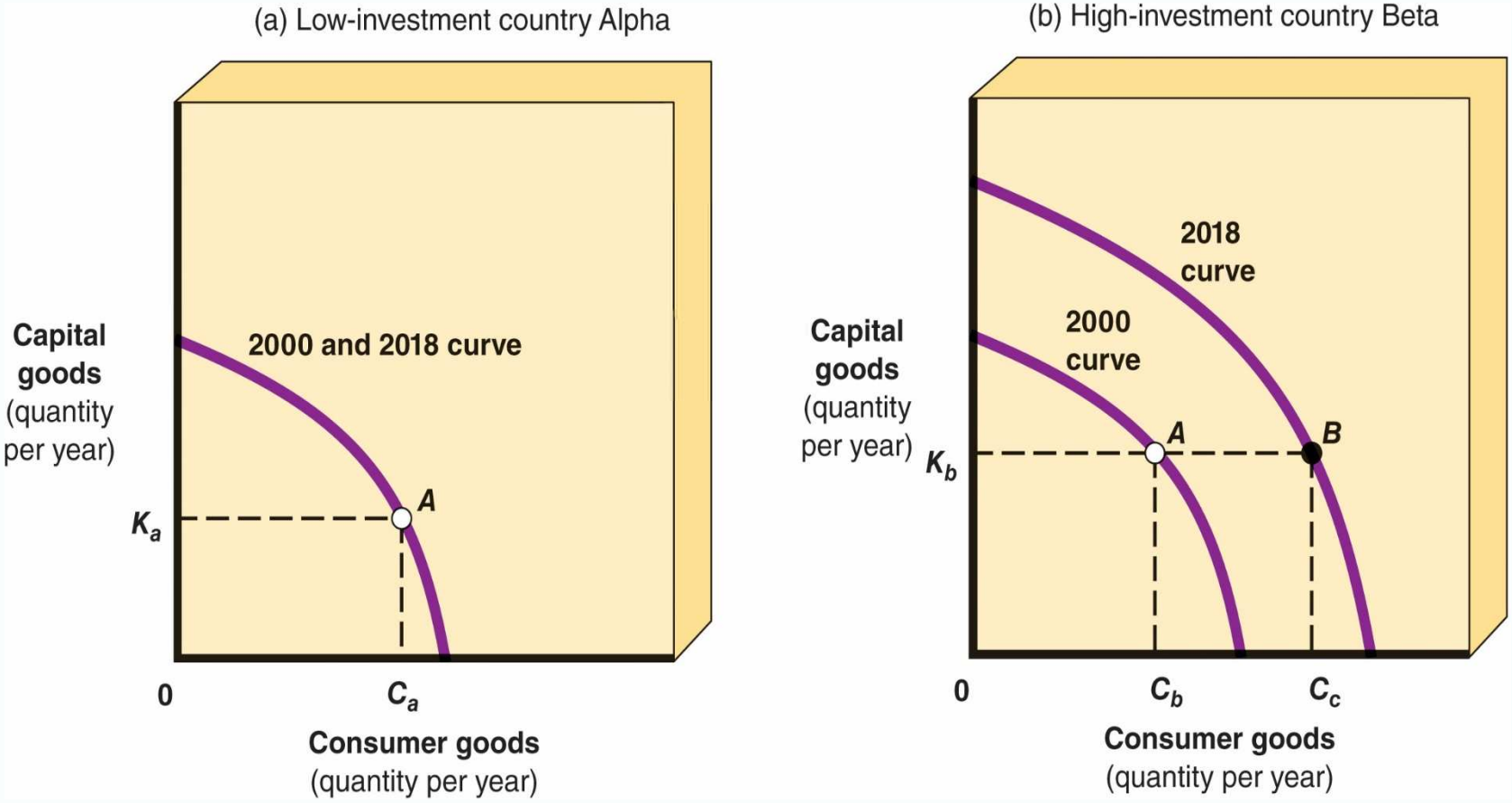
# **EXHIBIT 5** Alpha's and Beta's Present and Future Production Possibilities Curves

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# What conclusion can we make regarding investment?

A nation can accelerate economic growth by increasing its production of capital goods in excess of the capital being worn out in the production process.


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