Macroeconomics 13th edition Parkin Solutions Manual

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Table of Contents

■ **Part 1**	**Introduction**	
Chapter 1	What is Economics?	1
Appendix	Graphs in Economics	9
Chapter 2	The Economic Problem	21
Chapter 3	Demand and Supply	39
■ **Part 2**	**Monitoring Macroeconomic Performance**	
Chapter 4	Measuring GDP and Economic Growth	53
Chapter 5	Monitoring Jobs and Inflation	67
■ **Part 3**	**Macroeconomic Trends**	
Chapter 6	Economic Growth	81
Chapter 7	Finance, Saving, and Investment	93
Chapter 8	Money, the Price Level, and Inflation	105
Chapter 9	The Exchange Rate and the Balance of Payments	119
■ **Part 4**	**Macroeconomic Fluctuations**	
Chapter 10	Aggregate Supply and Aggregate Demand	133
Chapter 11	Expenditure Multipliers	149
Chapter 12	The Business Cycle, Inflation, and Deflation	165
■ **Part 5**	**Macroeconomic Policy**	
Chapter 13	Fiscal Policy	181
Chapter 14	Monetary Policy	195
Chapter 15	International Trade Policy	211

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Chapter 2

THE ECONOMIC PROBLEM

The Big Picture

Where we have been:

Chapter 1 introduced the economic reality that wants exceed the resources available to satisfy them—we face scarcity. Chapter 2 reinforces these central themes by laying out the core economic model, the Production Possibilities Frontier, or *PPF*, and uses it to illustrate the concepts of tradeoff and opportunity cost. Chapter 2 further details the concepts of marginal cost and marginal benefit, presenting a first look at the concept of efficiency. The second half of the chapter begins with a model of exchange between two people that shows the "win-win" situation created through specialization and free trade. The next sections show how those individual gains scale up to economy wide gains. Lastly the traditional circular flow model highlights transformation of resources into final goods and services along with the money used in those markets

Where we are going:

The key concept of *opportunity cost* and the widespread tendency for the opportunity cost of a good to increase as the quantity produced of that good increases returns in Chapter 3 when we explain the supply curve. For Micro classes, we see it again in Chapters 10 and 11 when we study a firm's costs and cost curves. Preferences return and are treated more rigorously when we explain marginal utility theory in Chapter 8 and indifference curves in Chapter 9. Efficiency returns in Chapter 5 when we study the efficiency of markets and first preview the impediments to efficiency. The gains from trade are explored more completely in the context of international trade in Chapter 7 in Microeconomics and Chapter 15 of Macroeconomics. Finally, the role of markets and prices in allocating resources and coordinating activity is an ongoing theme throughout most of the rest of the text. The next task, in Chapter 3, is to develop the central demand and supply model.

New in the Thirteenth Edition

Chapter 2 has been slightly reorganized and some new content has been added. The Worked Problem is now located before the Summary for all chapters in the book. The "Economics in the News" has a new article on President Trump's potential help to Rust Belt manufacturing.

The introduction includes some teaser questions about President Trumps proposed trade policy changes. The first "Economics in the News" has new content regarding kale production. "Economics in Action" has been updated for Hong Kong being "caught up" rather than "catching up" to the United States.

A major change to this chapter is that the Economic Growth section and Gains from Trade section have been switched so that Gains from Trade are explained first. This order is a more natural way to show the microeconomic foundations of macroeconomic concepts. As before, Gains from Trade illustrates Joe and Liz engaged in trade and the mutual benefits that result. The explanations have been refined along with an additional figure highlighting the "Liz-Joe Economy." The chapter then moves into Economic Growth and Economic Coordination. Here again, Parkin has enhanced the discussion by adding a figure "How Economic Growth Changes What We Produce" along with text narrative to accompany it.

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Lecture Notes

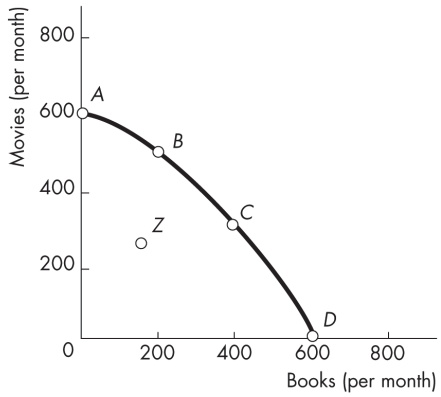
The Economic Problem

- Scarcity creates the need to make choices.
- Economic choices can be evaluated in terms of their efficiency.
- We can expand possible choices through capital accumulation and specialization and trade.

I. Production Possibilities and Opportunity Cost

- The **production possibilities frontier** (***PPF***) is the boundary between those combinations of goods and services that can be produced and those that cannot given available resources and technology.
- Consider the production choices for two goods: books and movies. The table with the data for the *PPF* is below and a figure showing the *PPF* is to the right.

	Books	Movies
A	0	600
B	200	500
C	400	300
D	600	0



- Production points beyond the *PPF* are not attainable without increases in resources or technology (these factors shift the *PPF*);
- Production points on and within the *PPF* are attainable, but production points within the *PPF*, such as point *Z*, are inefficient. It is possible to get more of one good without giving up any of the other.
- The *PPF* illustrates how scarcity creates the need to make choices. Producing more books (moving from point *A* to point *B*) means producing fewer movies, and producing more movies (moving from point *C* to point B) means producing fewer books.

Using the *PPF* above, make a point outside the *PPF* and ask the students about it. Once they state it is not possible, ask them how we could get there. After they highlight a few shifters, summarize for them that the resources and technology we held constant when we drew the PPF now relocate it when they change.
Now give them an example of a new movie camera invention and ask them if this will help us get more books? You will likely get an immediate round of "NO." Reply, "Are you sure?" and you should be able to find a student who sees that the new resource frees up other resources that can now be used for more books. Show them graphically a shift that is pinned at the book axis and it will open their eyes to how technology and resource growth in any sector can make more of all goods!

Production Efficiency

Production is efficient only on the frontier.

- We achieve **production efficiency** if we cannot produce more of one good without producing less of some other good.
- Inside the frontier (point *Z*), production is inefficient. Resources could be better employed to increase production of both books and movies.

Tradeoff Along the PPF

- Moving along the *PPF*, there is always a tradeoff involved in diverting resources from the production of one thing to another. We gain one thing but at the opportunity cost of losing something else.

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The key here is to make sure the student understands that given scarcity, because we produce one thing, we cannot produce something else. Some students will see the tradeoff immediately as a cost (giving up something), but they will incorrectly interpret that cost as only that valued in money units. To eliminate this ambiguity (better now than later), ask them to think about a meal they purchased recently. Now ask them what the money cost was as well as what else they might have picked for a meal? Most students pick up on this concept quickly with one or two more examples. And since this is a consumption example, tell them to put themselves in the place of an office manager, who must produce a service but can do so only given tradeoffs. While money costs are measurable and useful, propose to the students that opportunity costs are indeed even more useful in identifying the tradeoffs made in production.

Opportunity Cost

- The **opportunity cost** of an action is the highest valued alternative forgone.
- Opportunity cost is a ratio; it is the cost of an additional unit of a good measured in terms of what was given up to obtain that additional unit. The formula to calculate opportunity cost is decrease in the quantity produced of one good divided by the increase in the quantity produced of a another good.
- Efficiency means that the opportunity cost of producing more books or movies is the tradeoff along the frontier.

Increasing Opportunity Costs

- The "bowed-out" shape of the *PPF* reflects the principle of increasing opportunity cost.
- Not all resources are the same, which is why the *PPF* bows out. Publishers are better at producing books and Hollywood studios are better at producing movies. Moving along the frontier and producing more movies inevitably means that more and more publishers must produce movies. As this happens, the increase in movies becomes smaller and the decrease in books becomes larger.
- Emphasize the intercepts where the *PPF* crosses the axes. Take the vertical intercept in the figure. At this point all resources are used to produce movies. Basically to get to that point the economy has crammed and slammed every resource into movie production. Now when the economy moves down the *PPF* to produce the first book, that book is really inexpensive—has very low opportunity cost—because the economy uses resources better suited for book production first rather than movies.
- As more and more resources are diverted from production of one good to another, the smaller the additional increase in the production of the one good will be and the larger the decrease in the production of the other good.

You can bring in the relationship of slope and opportunity cost here if you want. OPTION 1: A soft way to bring in slope is to offer it as a double check on calculating marginal cost: "The opportunity cost of whatever is being measured on the horizontal axis is equal to the magnitude of the slope of the *PPF*." OPTION 2: You can also introduce the slope of a curve as the slope of a tangent line to the curve, that is, the slope of the line that is "just kissing" the curve at a single point.

The bowed-out shape is a key feature of typical *PPFs*, often overlooked by the student (and too often not accentuated by the instructor). The key here is to link the ever increasing opportunity cost exhibited by the shape of a bowed out *PPF* with that of the marginal cost curve, which is upward sloping. Simply stated, some resources are better suited for the production of one good or the other.

To make the *PPF* model useful, it was necessary to simplify. By considering the case where production of all goods other than two remain fixed, we can use a relatively simple picture to see how concepts apply to the real world. With three goods, we would have a 3-D frontier surface. With more than 3 goods, it would be impossible to represent the frontier using a graph. The cool thing is that all relevant results of the 2-D model are true in the N-good model.

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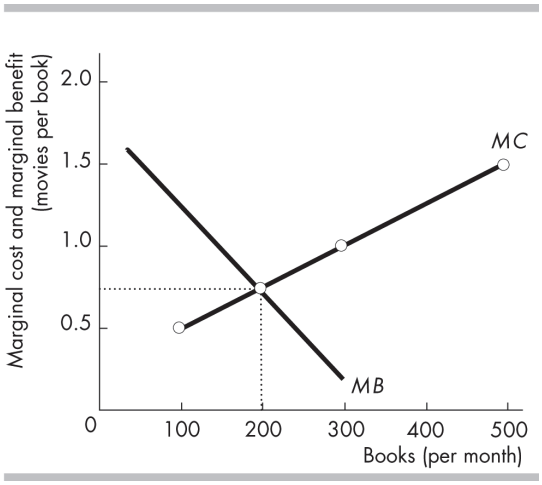
II. Using Resources Efficiently

Which point on the *PPF* best serves the public interest? To answer this question, we must measure and compare costs and benefits of different points.

The PPF *and Marginal Cost*

- **Marginal cost** is the opportunity cost of producing one more unit of a good.
- As more books are produced, the marginal cost of a book increases. The table shows the marginal cost of producing books from the *PPF* data presented before and the figure shows the upward sloping marginal cost curve.

	Books	Marginal cost of a book (movies per book)
A	0	
		0.5
B	200	
		1.0
C	400	
		1.5
D	600	



Preferences and Marginal Benefit

- **Preferences** are a description of a person's likes and dislikes.
- The **marginal benefit** of a good or services is the benefit received from consuming one more unit of it.
- The *principle of decreasing marginal benefits* is why the **marginal benefit curve** in the figure above slopes downward.

You might have some students that have had a microeconomics course in their past, and have already been introduced to the concept of marginal cost and marginal benefit. And, they might inquire if the marginal benefit curve is linked to the Law of Diminishing Marginal Utility. While this might be adequate discussion for an advanced undergraduate course, and certainly a graduate micro seminar, pass it up in your principles course. Let the student know that the goal is to employ demand side concepts, in a marginal sense. As such, key in on the fact that the marginal benefit curve can be characterized as a willingness to pay curve.

Keep the discussion of marginal cost and marginal benefit separate and distinct, making sure that the student realizes these are in essence the foundation of market forces (supply and demand, respectively). While the *PPF* can tell us the opportunity costs in production, and the tradeoffs therein, it is the market that allows us to determine the allocatively efficient point. Allocative efficiency only occurs with a balance between benefits and costs, *at the margin.*

Allocative Efficiency

Allocative efficiency occurs only when marginal benefit equals marginal cost.

- In the figure, when 100 books per month are produced, the marginal benefit from another book exceeds its marginal cost, which means that people prefer another book more than the movies they must give up.
- When the allocatively efficient number of books, 200 per month, is produced, the *PPF* in the previous figure shows that the allocatively efficient number of movies is 500 movies per month.
- When marginal cost equals marginal benefit it is impossible to make people better off by reallocating resources.

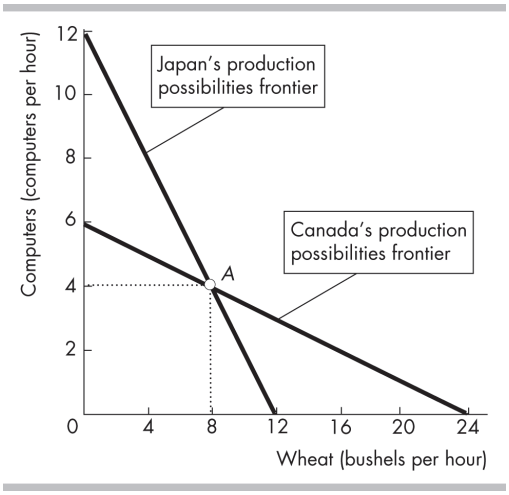
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III. Gains from Trade

Specialization and trade expand consumption possibilities

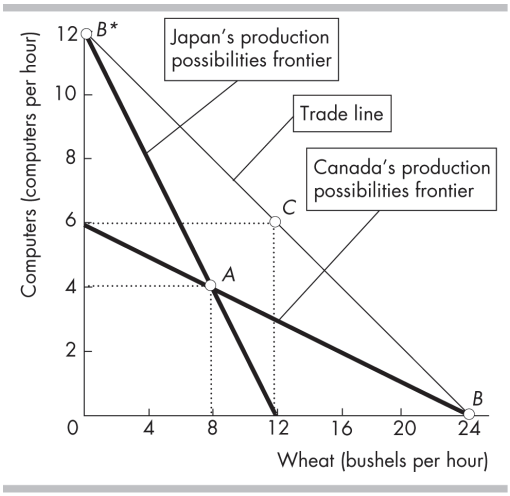
Comparative Advantage and Absolute Advantage



- A person has a **comparative advantage** in an activity if that person can perform the activity at a lower opportunity cost than anyone else.
- The *PPF* shows opportunity cost. In the figure the opportunity cost of a bushel of wheat in Canada is 1/4 of a computer and in Japan it is 1 computer. In Canada the opportunity cost of a computer is 4 bushels of wheat and in Japan it is 1 bushel of wheat. Canada has a comparative advantage in producing wheat and Japan has a comparative advantage in producing computers.
- A person has an **absolute advantage** if that person is more productive than others in that activity or activities. A person (or country) can have an absolute advantage in all activities but that person (or country) will *not* have a comparative advantage in all activities.

An easy way for students to remember the difference between comparative and absolute advantages is that with comparative advantage, the opportunity costs comparison matters. If one has a comparative advantage in producing something, they should specialize in production of that good or service. An absolute advantage can be characterized by being able to "absolutely out-produce" the other economic agent. Even though a country might have absolute advantages, it should not produce everything, and should focus on identifying its comparative advantages.

Achieving the Gains from Trade



- When countries specialize by producing the good in which each country has a comparative advantage more goods in total can be produced. If without trade Canada and Japan *each* produce at point *A*, a total of 8 computers and 16 bushels of wheat are produced. If they specialize according to comparative advantage, Japan produces at point *B** and Canada produces at point *B* for a combined total of 12 computers and 24 bushels of wheat.
- Trade allows consumption to be different than production for each nation, so Canada can trade wheat for computers and Japan can trade computers for wheat. Because more computers and more wheat are produced, both nations can consume more than they can produce on their own. For example, suppose that the market price of wheat is ½ computer per 1 bushel of wheat. As illustrated, each country can now be consuming at point *C* along the trade line. Note that each country's consumption point lies *beyond* its own *PPF*.
- The gains from trade can now be easily seen in terms of Japan and Canada each gaining 2 computers and 4 bushels of wheat compared to their initial, no-trade consumption points. Note that it is more likely that point C for each country will be on a different point on the trade line according to preferences. In the end,

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the sum of consumption among the two countries must equal the sum of production (imports=exports). For simplicity, this example has points A and C equal for both countries.

You may want to motivate the gains from trade using an example loosely based on Tom Hanks in the movie *Castaway*. Ask the students, "Was Tom by himself on the island an economy?" Use a couple goods like fish and coconuts and show Tom's production possibilities. Discuss what are the essential elements needed to have an economy. Tom produces food and then he consumes it but is this sufficient for us to call him an economy? It is an open-ended question that I end with Tom needing somebody to trade with. Once a new person washes up on shore, the two can specialize in the good for which he or she has a comparative advantage and trade for the other. Give one of them an absolute advantage and then show how consumption possibilities lie outside each person's production possibilities. This shows the power of specialization and trade in a way that personalizes it for the student.

To show the gains from trade you can use candy or any kind of small trinkets. Make sure that each person initially gets Then:

1. Create several countries with approximately even student populations. Give each country at least 3 or 4 items such as different types of candy. You can have some fun and add in a few entertaining items. For example: a can of spam, sticks of beef jerky, bubbles, etc.
2. Students record individual happiness value from 1-10 on initial allocation (I use an Excel spreadsheet to easily aggregate data at the end but keeping track on paper is fine).
3. Allow the countries to trade with each other
4. Have the students record their new happiness level after trade.
5. Compare the "happiness" level after trade with that before trade.

Here are the key points that come from the experiment:

- Both parties become better off when they engage in voluntary trade.
- Even without production, trade creates value.

IV. Economic Growth

Economic growth expands production possibilities and shifts the *PPF* outward.

- **Technological change** (the development of new goods and of better ways of producing goods and services) and **capital accumulation** (the growth of capital resources, which includes human capital) lead to economic growth.

You can have some fun and generate some discussion by getting the students to think about what life might be like after another 200 years of economic growth. Provide some numbers: In 2017, income per person in the United States was about $133 a day. In 1808 it was about 70¢ a day, and if the past growth rate prevails for another 200 years, in 2208 it will be $14,000 a day. Emphasize the magic of compound growth. If they think that $14,000 a day is a big income, get them to do a ballpark estimate of the daily income of Bill Gates (about $10 *million*!). Encourage a discussion of why scarcity is still present even at these large incomes.

The Cost of Economic Growth

- Economic growth requires that resources must be devoted to developing technology or accumulating capital, which means that current consumption decreases. The decrease in current consumption is the opportunity cost of economic growth.

A Nation's Economic Growth

- Countries that devote a higher share of resources to developing technology or accumulating capital are more likely to grow faster.

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- Some nations, such as Hong Kong, have chosen faster capital accumulation at the expense of current consumption and so have experienced faster economic growth.

Running through the above example can really help students catch on to how economic growth is linked to choices (less consumption now for more later). You may wish to demonstrate more consumption or more capital biased shifts of the *PPF*, to demonstrate changes in opportunity costs.

Changes in What We Produce

- In a low-income country, just producing enough food is a high priority, and the marginal benefit from food is high. So in Ethiopia, agriculture accounts for a large 36 percent of total production.
- In China, where production per person is 7 times that of Ethiopia, agriculture shrinks to 9 percent of total production and industry expands to 41 percent.
- Further investment in capital and in advanced robot technologies expand production possibilities to the level in the United States, which today is 4 times (per person) its level in China.

V. Economic Coordination

Firms and Markets

- A **firm** is an economic unit that hires factors of production and organizes those factors to produce and sell goods and services.
- A **market** is any arrangement that enables buyers and sellers to get information and to do business with each other.

Property Rights and Money

- The social arrangements that govern the ownership, use, and disposal of resources, goods, and services are called **property rights**. Types of property include real (buildings and land), financial (stocks and bonds) and intellectual (ideas and technology).
- **Money** is anything generally accepted as a means of payment. Money's main purpose is to facilitate trade.

Students are usually fixated on money, but ask them to dig deeper. It is what we can do or buy with money that brings us happiness not the actual bills themselves. Our focus on money creates a "veil" that hides the real economic engine of capitalism.

Circular Flows Through Markets

- Firms and households interact in markets and it is this interaction that determines what will be produced, how it will be produced, and who will get it.

Coordinating Decisions

- Prices within markets coordinate firms' and households' decisions.

Everyone knows what prices are. But not everyone knows why prices rise or fall. The point is that no one needs to know *why* a price has changed when making the choice to buy or sell. All that someone needs to know is what the price is relative to what he or she believes the item to be worth.

- Enforced property rights ensure that exchange is voluntary (not theft). Property rights and prices help insure that production takes place efficiently without waste because the owner of a firm has the property right to any profit the firm can earn.

Willingness to pay affects production and production affects willingness to pay. It would appear that we have the classic "which came first, the chicken or the egg" conundrum. However, in the next chapter, we will discuss the most powerful model in economics, Demand and Supply, which allows us to think clearly about the behavior of markets.

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Additional Problems

1. Jane's Island's production possibilities are given in the table to the right.

Corn (pounds per month)		Cloth (yards per month)
3.0	and	0
2.0	and	2
1.0	and	4
0	and	6

a. Draw a graph of the production possibility possibilities frontier on Jane's Island.

b. What are Jane's opportunity costs of producing corn and cloth at each output in the table?

2. In problem 1, Jane is willing to give up 0.75 pounds of corn per yard of cloth if she has 2 yards of cloth; 0.50 pounds of corn per yard of cloth if she has 4 yards of cloth; and 0.25 pound of corn per yard of cloth if she has 6 yards of cloth.

a. Draw a graph of Jane's marginal benefit from corn.

b. What is Jane's efficient quantity of corn?

3. Joe's production possibilities are given in the table to the right. What are Joe's opportunity costs of producing corn and cloth at each output in the table?

Corn (pounds per month)		Cloth (yards per month)
6	and	0
4	and	1.0
2	and	2.0
0	and	3.0

4. In problems 1 and 2, Jane's Island produces and consumes 2 pounds of corn and 2 yards of cloth. Joe's Island produces and consumes 2 pounds of corn and 2 yard of cloth. Now the islands begin to trade.

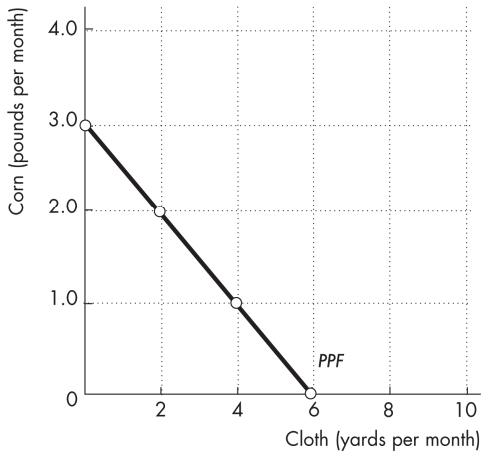
a. What good does Jane sell to Joe and what good does Jane buy from Joe?

b. If Jane and Joe divide the total output of corn and cloth equally, what are the gains from trade?

Solutions to Additional Problems

1. a. Jane's Island's *PPF* is a straight line. To make a graph of Jane's Island's *PPF* measure the quantity of one good on the *x*-axis and the quantity of the other good on the *y*-axis. Plot the quantities in each row of the table. Figure 2.1 illustrates Jane's Island's *PPF*.

FIGURE **2.1**



b. The opportunity cost of 1 pound of corn is 2 yards of cloth. The opportunity cost of the first pound of corn is 2 yards of cloth. To find the opportunity cost of the first pound of corn, increase the quantity of corn from 0 pounds to 1 pound. In doing so, Jane's Island's production of cloth decreases from 6 yards to 4 yards. The opportunity cost of the first pound of corn is 2 yards of cloth. Similarly, the opportunity costs of producing the second pound and the third pound of corn are 2 yards of cloth.

The opportunity cost of 1 yard of cloth is 0.5 pound of corn. The opportunity cost of producing the first 2 yards

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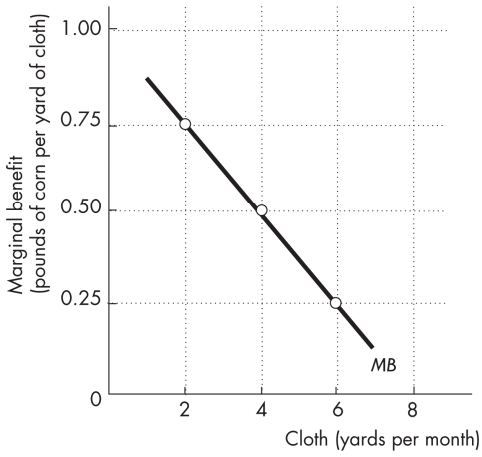
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of cloth is 1 pound of corn. To calculate this opportunity cost, increase the quantity of cloth from 0 yards to 2 yards. Jane's Island's production of corn decreases from 3 pounds to 2 pounds. Similarly, the opportunity cost of producing the second 2 yards and the third 2 yards of cloth are 1 pound of corn.

2. a. The marginal benefit curve slopes downward. To draw the marginal benefit curve from cloth, plot the quantity of cloth on the *x*-axis and the willingness to pay for cloth (that is, the number of pounds of corn that Jane is willing to give up to get a yard of cloth) on the *y*-axis, as illustrated in Figure 2.2.

   b. The efficient quantity is 4 yards a month. The efficient quantity to produce is such that the marginal benefit from the last yard equals the opportunity cost of producing it. The opportunity cost of a yard of cloth is 0.5 pound of corn. The marginal benefit of the fourth yard of cloth is 0.5 pound of corn. And the marginal cost of the fourth yard of cloth is 0.5 pound of corn.

FIGURE **2.2**



3. Joe's Island's opportunity cost of a pound of corn is 1/2 yard of cloth, and its opportunity cost of a yard of cloth is 2 pounds of corn. When Joe's Island increases the corn it produces by 2 pounds a month, it produces 1 yard of cloth less. The opportunity cost of 1 pound of corn is 1/2 yard of cloth. Similarly, when Joe's Island increases the cloth it produces by 1 yard a month, it produces 2 pounds of corn less. The opportunity cost of 1 yard of cloth is 2 pound of corn.

4. a. Jane's Island sells cloth and buys corn. Jane's Island sells the good in which it has a comparative advantage and buys the other good from Joe's Island. Jane's Island's opportunity cost of 1 yard of cloth is 1/2 pound of corn, while Joe's Island's opportunity cost of 1 yard of cloth is 2 pounds of corn. Jane's Island's opportunity cost of cloth is less than Joe's Island's, so Jane's Island has a comparative advantage in producing cloth.

   Jane's Island's opportunity cost of 1 pound of corn is 2 yards of cloth, while Joe's Island's opportunity cost of 1 pound of corn is 1/2 yard of cloth. Joe's Island's opportunity cost of corn is less than Jane's Island's, so Joe's Island has a comparative advantage in producing corn.

   b. With specialization and trade, together they can produce 6 pounds of corn and 6 yards of cloth and each will get 3 pounds of corn and 3 yards of cloth—an additional 1 pound of corn each and an additional 1 yard of cloth each. Hence the total gains from trade are 2 yards of cloth and 2 pounds of corn.

Additional Discussion Questions

1. ***Use the* PPF *model to analyze an "Arms Race" between nations.*** You might like to get the students to realize how useful even a simple economic model (such as the *PPF* model) is for helping us understand and interpret important political events in history. Draw a *PPF* for *military* goods and *civilian* goods production (or, simply, the traditional example of "guns versus butter"). Then draw another *PPF* for a country that is about twice the size of the first, but with the same degree of concavity as the *PPF* for the first country. Now assume that each country considers the other as a mortal "enemy," and that they engage in a costly "arms race." Each country picks a point on the *PPF* that produces an equal level of military output (in absolute terms).

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What would happen if the larger country decided to increase military production? Emphasize that while the distance on the military output axis at the point of production is *equal* for both countries, the resulting distance on the civilian output axis is (by definition) a smaller quantity for the smaller country. The large country can create significant economic and political pressures on the government of the small country by forcing the small country to *match* the increase in military production. The *PPF* reveals how much more additional civilian output is forgone by the citizens of the small economy relative to the citizens of the larger economy. Emphasize also that the *opportunity cost* of civilian goods is higher for the smaller country.

What were the economic repercussions of the Cold War? History and political science majors quickly perceive that these two *PPF* models reflect the Cold War relationship between the United States and the U.S.S.R. during the early 1980s. The Reagan administration increased U.S. military expenditures during the early 1980s to a post–Viet Nam War peak of 6.6 percent of GDP (as compared to about 3.5 percent of GDP in the late 1990s). Many experts agree that this strategy contributed to the many political and economic pressures that ultimately lead to the dissolution of the U.S.S.R.

What are the implications for the next 50 years? China is currently the world's second largest economy. It could become the biggest by mid-century. How does this development influence the strategic balance and the position of the United States?

2. ***Using the PPF model to analyze global environmental agreements between nations.*** This application of the *PPF* is a more "green" perspective that uses the same logic as the "Arms Race" on a timely international policy issue. Compare a rich economy *PPF* to a poor economy *PPF*, each with the same degree of concavity. (Production levels are now measured as output per person.) The goods are now "cleaner air" and "other goods and services."

   What if the citizens of each country were required to make equal reductions in per-person greenhouse gas emissions? Show an equal quantity increase in per person output on the clean air axis for both countries' *PPF* curves. Show how the opportunity cost of requiring additional pollution reduction (cleaner air) of equal amounts per person is much greater for the citizens of a poorer country than for the citizens of the richer country. This fact has been used to persuade developed countries (like the United States) to accept larger pollution reduction targets than developing countries (like China, India, and African nations).

3. ***Why do some of the brightest students not get a 4.0 GPA?*** The answer—because it doesn't achieve allocative efficiency—can now be approached. The first conceptual step is to derive the marginal cost curve from the *PPF*. The table provides eight points on the *MC* curve. Tell the students that this table is from a *PPF* between hours spent at recreation and GPA. Use this opportunity to explain why we plot marginal values at the midpoints of changes because the marginal cost at the midpoint approximately equals the average of the opportunity costs across the interval.

Recreation (hours per day)	Marginal cost (GPA points per hour)
0.5	0.1
1.5	0.2
2.5	0.3
3.5	0.4
4.5	0.5
5.5	0.6
6.5	0.7
7.5	0.8

   The students must now think about *preferences* for recreation and study. You'll be surprised how many students want to derive preferences from the *PPF!* Explain that the *PPF* provides the constraint—what is feasible—and preferences provide the objective—what is desirable in the opinion of the chooser.

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Each additional hour of recreation likely yields a smaller marginal benefit to the student. Translate this to the proposition that the student's willingness to give up GPA points for additional hours of recreation decreases and provide a table similar to that in Figure 2.3 that captures this observation. The table has a preference schedule. Stress once again that this table did *not* come from the *PPF*.

Recreation (hours per day)	Willingness to pay (GPA points per hour)
0.5	0.7
1.5	0.6
2.5	0.5
3.5	0.4
4.5	0.3
5.5	0.2
6.5	0.1
7.5	0

To determine the efficient amount of recreation and hence study time, the student must ask "Do I study a little bit longer?" That is the question. Walk the student through the thought experiment:

1. If I study for 8 hours a day I get a 4.0, but I am willing to pay much more than I will pay if a take a bit of time off studying and have some fun. So I will be better off if study less and take more recreation time.
2. If I don't study at all I get a 0.4, and I am paying much more in lost GPA than I am willing to pay for the last bit of fun. So I will be better off if I study more and take less recreation time.
3. The only allocation at which I can't become better off by studying a little bit more or a little bit less is where I am just willing to pay what the last bit of recreation costs—where marginal cost equals marginal benefit.

In this example, the student studies for 4.5 hours and takes 3.5 hours a week of recreation time.

Explain that there is nothing strange or wrong with the fact that the student gets no net benefit from the last seconds-worth of recreation time. He or she is just willing to pay what it costs him or her.

4. ***Gains from Trade*** The gain from trade is a real eye-opener for students. Their first reaction is one of skepticism. Convincing students of the power of trade to raise living standards and the costs of trade restriction is one of the most productive things we will ever do. Here are some questions to drive home the idea of comparative advantage:

   Why didn't Billy Sunday do his own typing? Billy Sunday, an evangelist in the 1930s, was reputed to be the world's fastest typist. Nonetheless, he employed a secretary who was a slower typist than he. Why? Because in one hour of preaching, Billy could raise several times the revenue that he could raise by typing for an hour. So Billy plays to his comparative advantage.

   Why doesn't Martha Stewart bake her own bread? Martha Stewart is probably a better cook than most people, but she is an even better writer and TV performer on the subject of food. So Martha plays to her comparative advantage and writes about baking bread but buys her bread.

   Why doesn't Vinnie Jones play soccer? Vinnie Jones was one of the world's best soccer players. But he stopped playing soccer and started making movies some years ago. Why? Because, as he once said, "You go to the bank more often when you're in movies." Vinnie's comparative advantage turned out to be in acting.

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2 THE ECONOMIC PROBLEM

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After studying this chapter, you will be able to:

- Define the production possibilities frontier and use it to calculate opportunity cost
- Define preferences and marginal benefit and describe an efficient allocation of resources
- Explain how specialization and trade make resource use more efficient
- Explain how current production choices expand future production possibilities, but change what we produce, and destroy and create jobs
- Describe the economic institutions that coordinate decisions

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Production Possibilities and Opportunity Cost

The **production possibilities frontier** (*PPF*) is the boundary between those combinations of goods and services that can be produced and those that cannot.

To illustrate the *PPF*, we focus on two goods at a time and hold the quantities of all other goods and services constant.

That is, we look at a model economy in which everything remains the same (*ceteris paribus*) except the two goods we're considering.

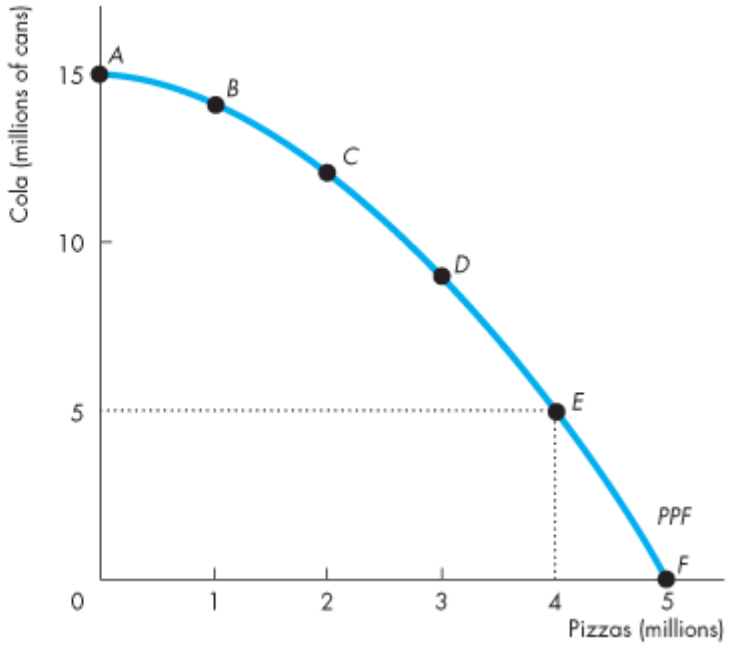
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Production Possibilities and Opportunity Cost

Production Possibilities Frontier

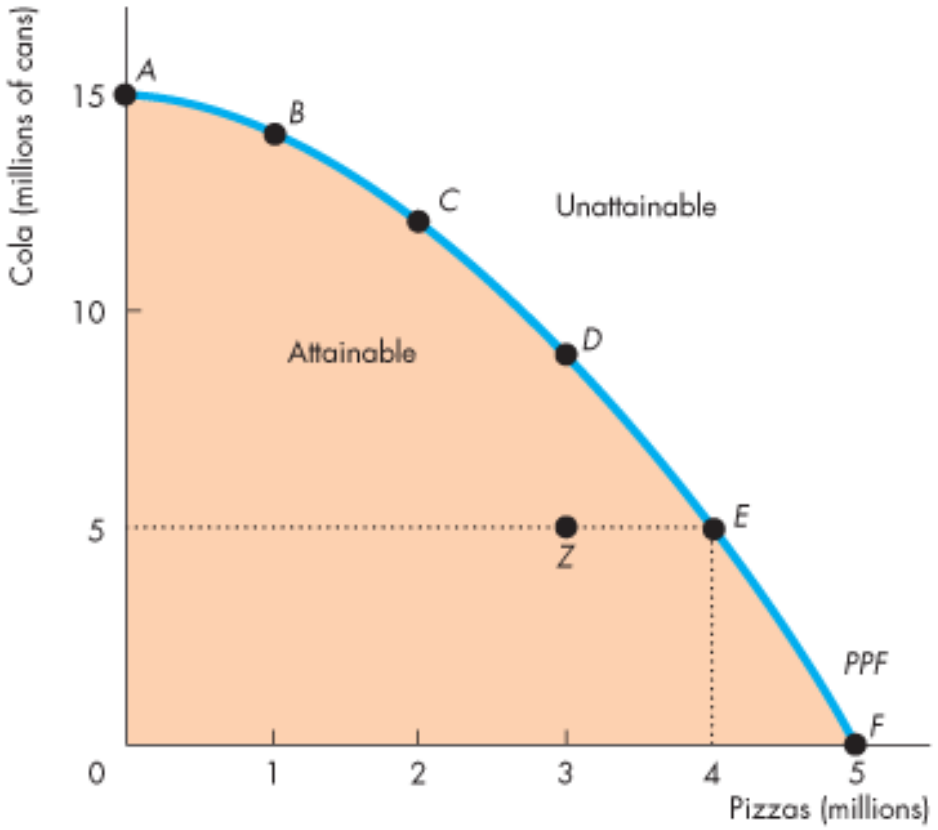
Figure 2.1 shows the *PPF* for two goods: cola and pizzas.

Possibility	Pizzas (millions)		Cola (millions of cans)
A	0	and	15
B	1	and	14
C	2	and	12
D	3	and	9
E	4	and	5
F	5	and	0



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Possibility	Pizzas (millions)		Cola (millions of cans)
A	0	and	15
B	1	and	14
C	2	and	12
D	3	and	9
E	4	and	5
F	5	and	0



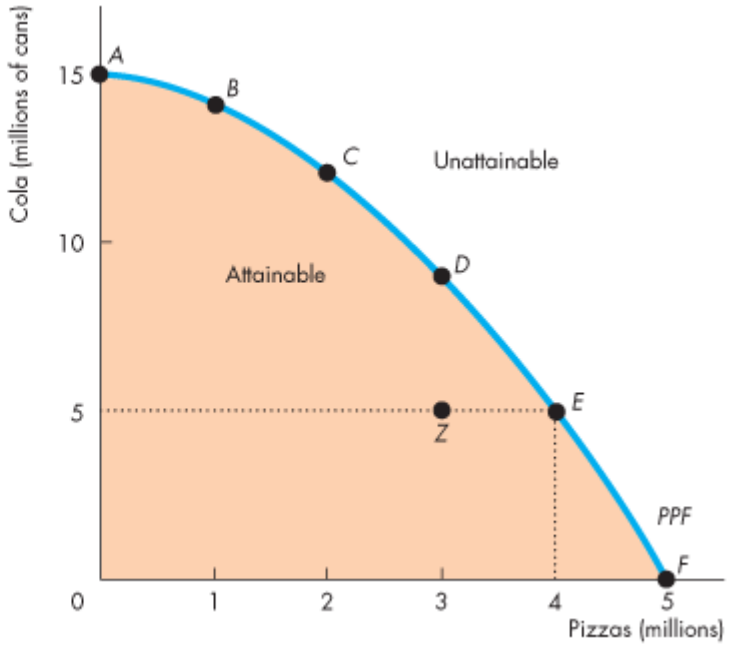
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Production Possibilities and Opportunity Cost

Any point *on* the frontier such as *E* and any point *inside* the *PPF* such as *Z* are attainable.

Points outside the *PPF* are unattainable.

Possibility	Pizzas (millions)		Cola (millions of cans)
A	0	and	15
B	1	and	14
C	2	and	12
D	3	and	9
E	4	and	5
F	5	and	0



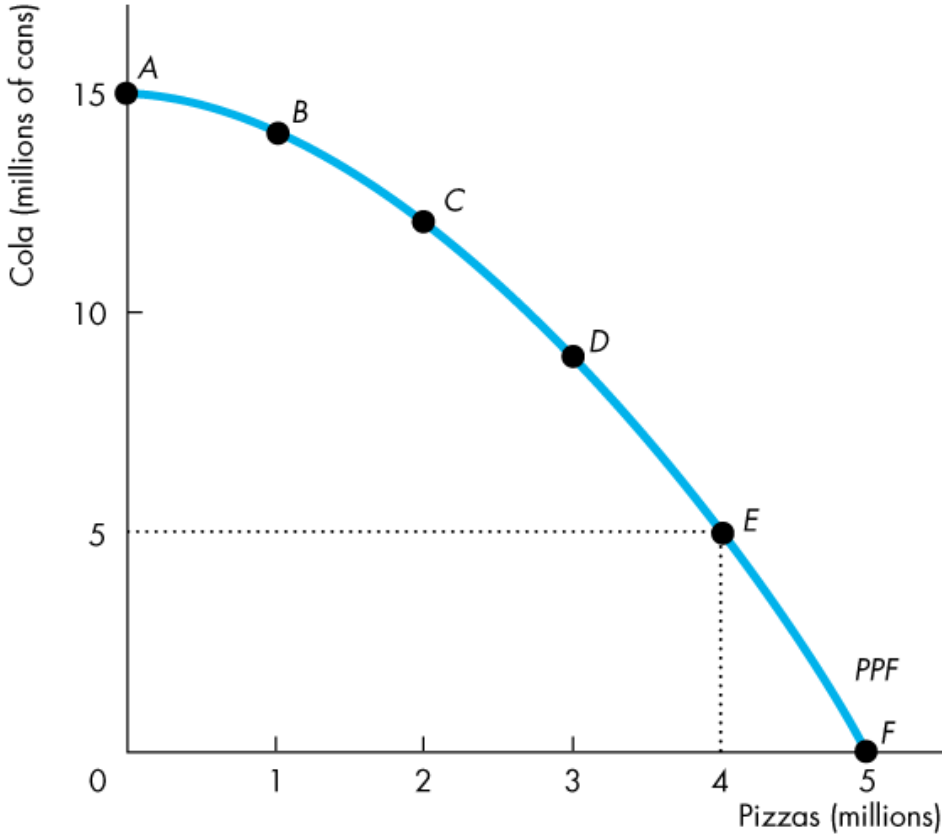
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Production Possibilities and Opportunity Cost

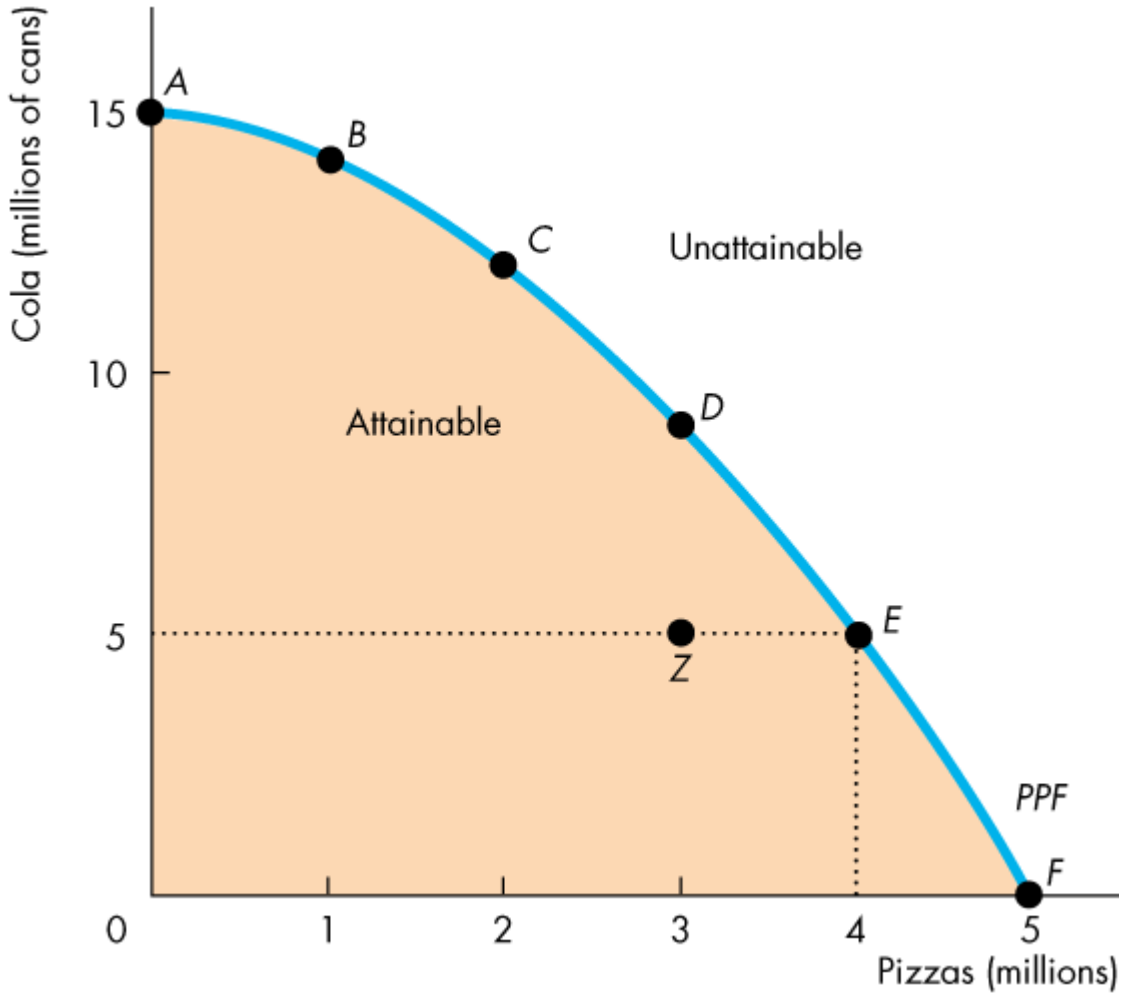
Production Efficiency

We achieve **production efficiency** if we cannot produce more of one good without producing less of some other good.

All points on the *PPF* are *efficient*.



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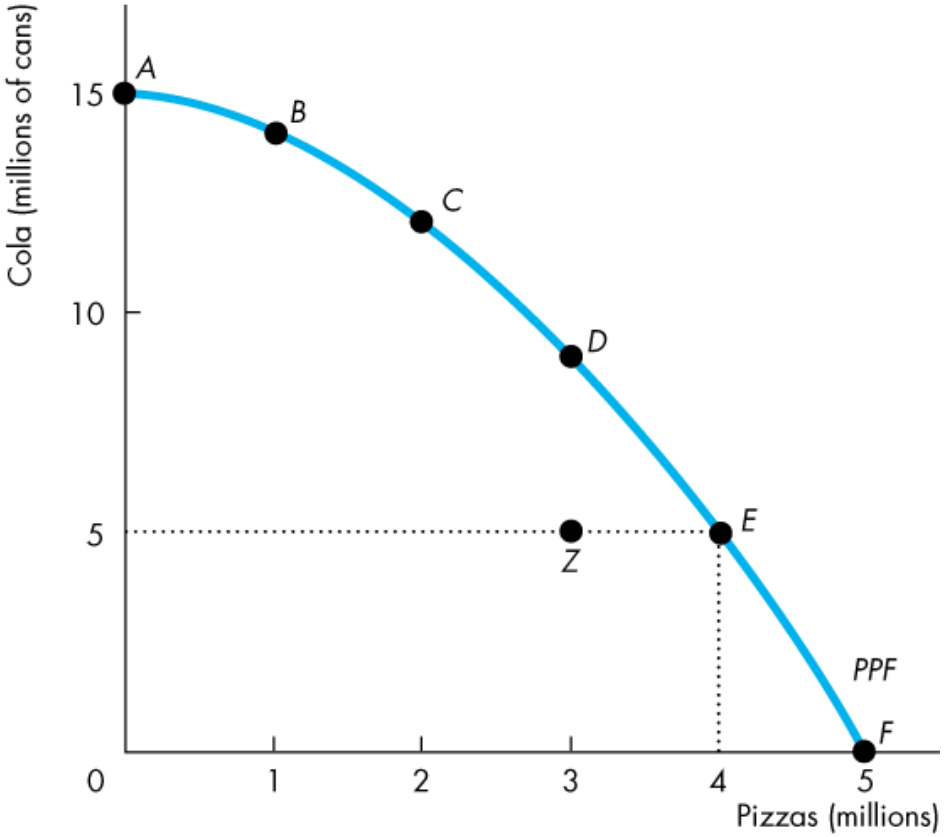
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Production Possibilities and Opportunity Cost

Any point inside the frontier, such as *Z*, is *inefficient*.

At such a point, it is possible to produce more of one good without producing less of the other good.

At *Z*, resources are either unemployed or misallocated.



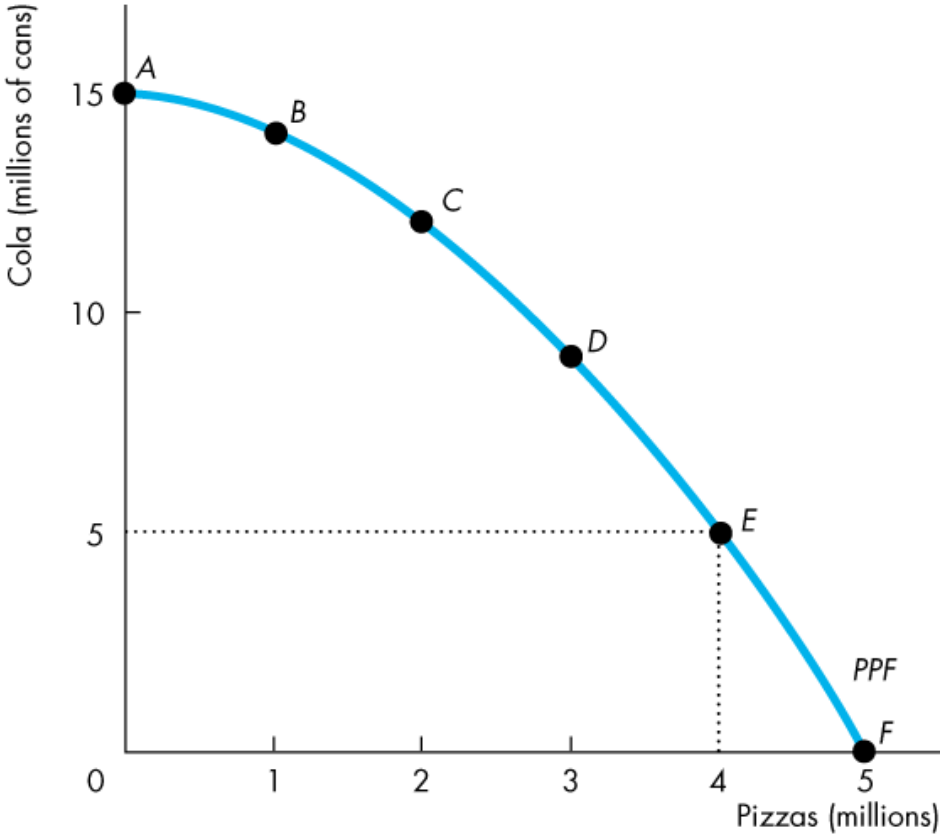
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Production Possibilities and Opportunity Cost

Tradeoff Along the *PPF*

Every choice along the *PPF* involves a *tradeoff*.

On this *PPF*, we must give up some cola to get more pizzas or we must give up some pizzas to get more cola.



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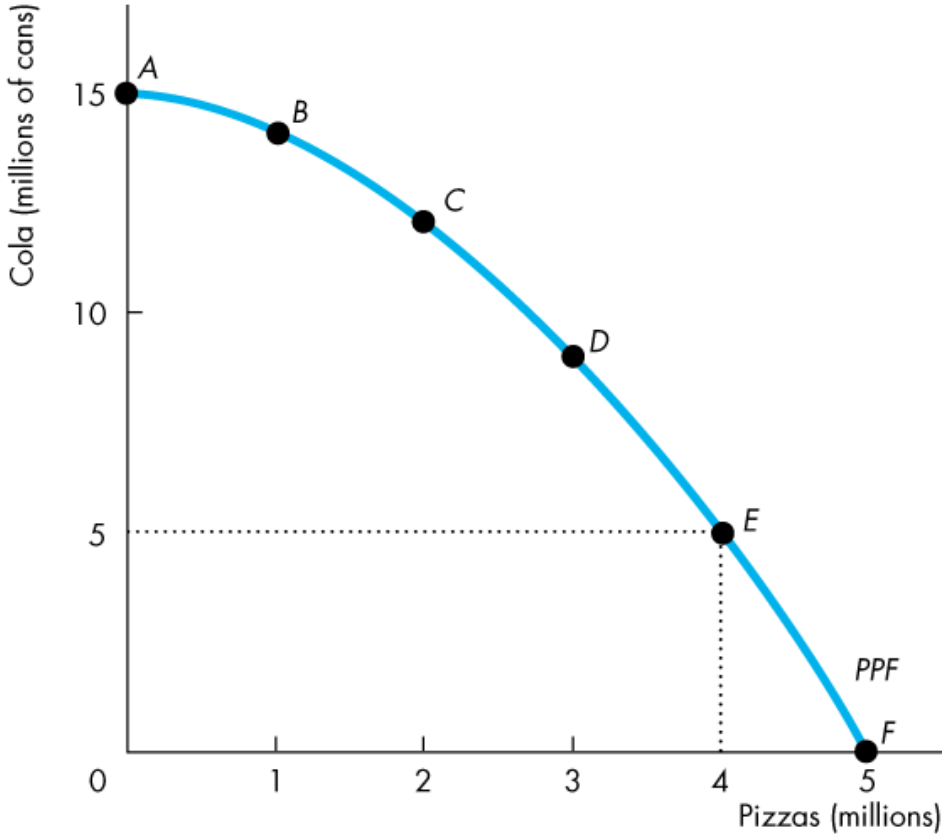
Production Possibilities and Opportunity Cost

Opportunity Cost

As we move down along the *PPF*,

we produce more pizzas, but the quantity of cola we can produce decreases.

The opportunity cost of a pizza is the cola forgone.



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Production Possibilities and Opportunity Cost

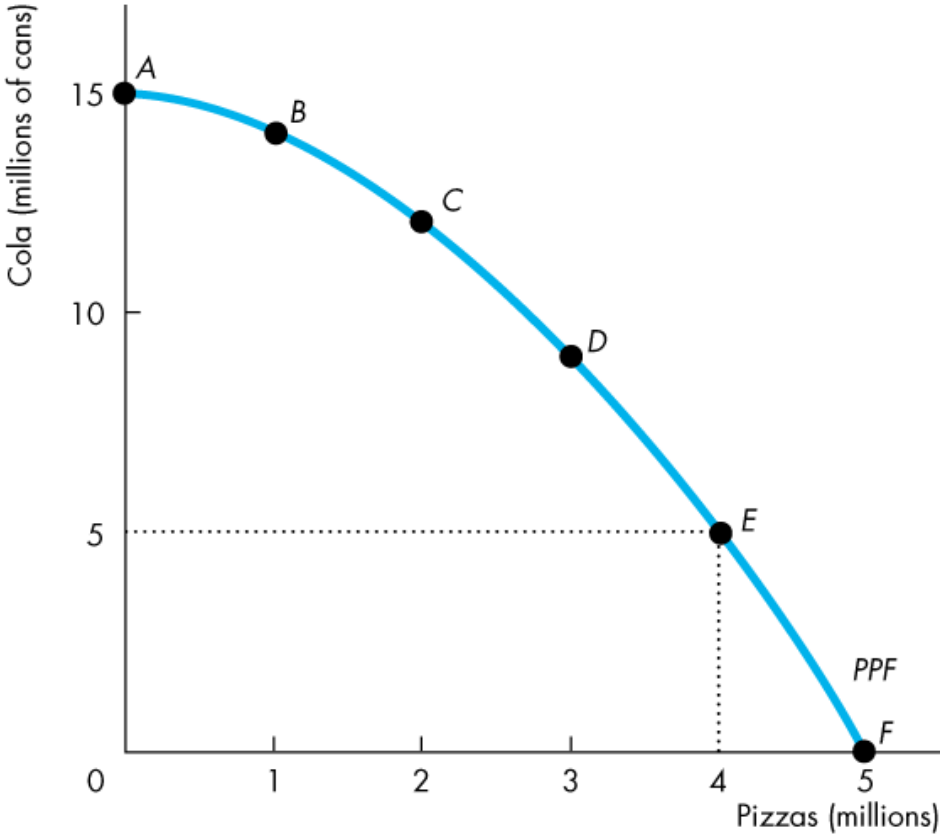
In moving from *E* to *F*:

The quantity of pizzas increases by 1 million.

The quantity of cola decreases by 5 million cans.

The opportunity cost of the fifth 1 million pizzas is 5 million cans of cola.

One of these pizzas costs 5 cans of cola.



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Production Possibilities and Opportunity Cost

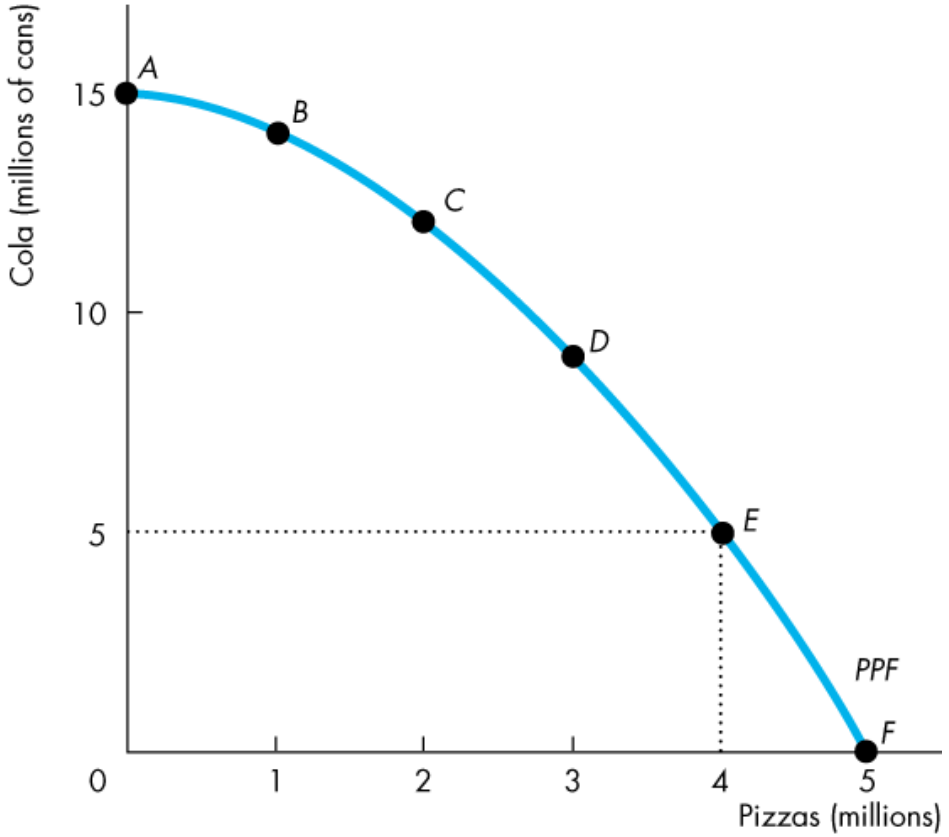
In moving from *F* to *E*:

The quantity of cola increases by 5 million cans.

The quantity of pizzas decreases by 1 million.

The opportunity cost of the first 5 million cans of cola is 1 million pizzas.

One of these cans of cola costs 1/5 of a pizza.



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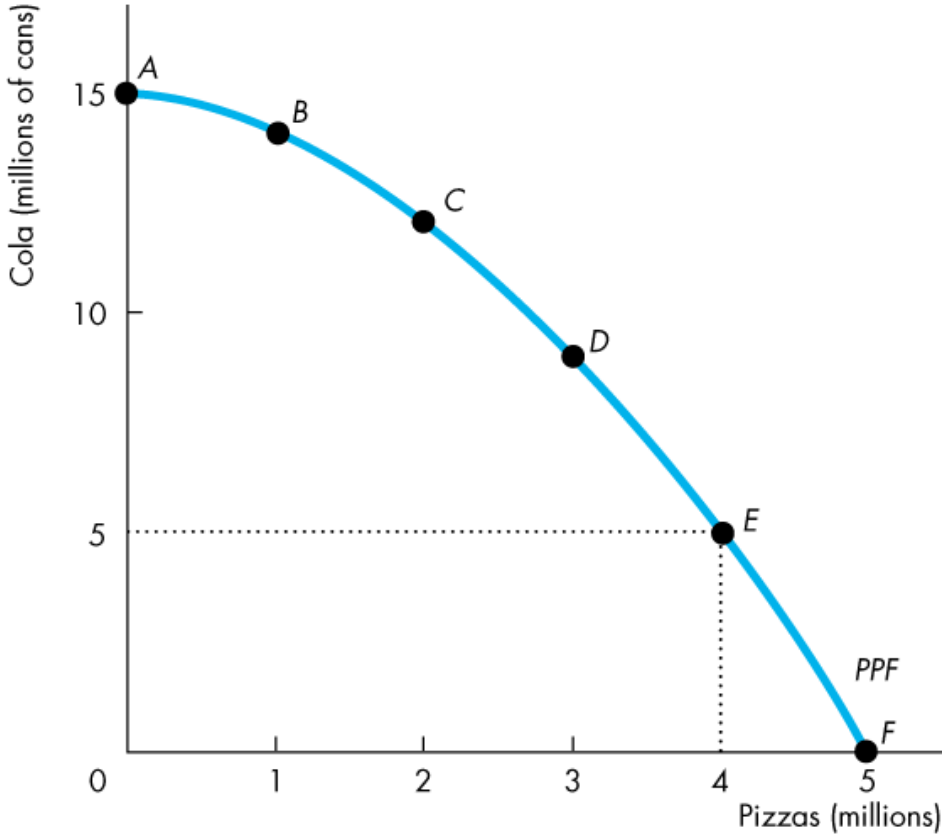
Production Possibilities and Opportunity Cost

Opportunity Cost Is a Ratio

The opportunity cost of producing a can of cola is the *inverse* of the opportunity cost of producing a pizza.

One pizza costs 5 cans of cola.

One can of cola costs 1/5 of a pizza.



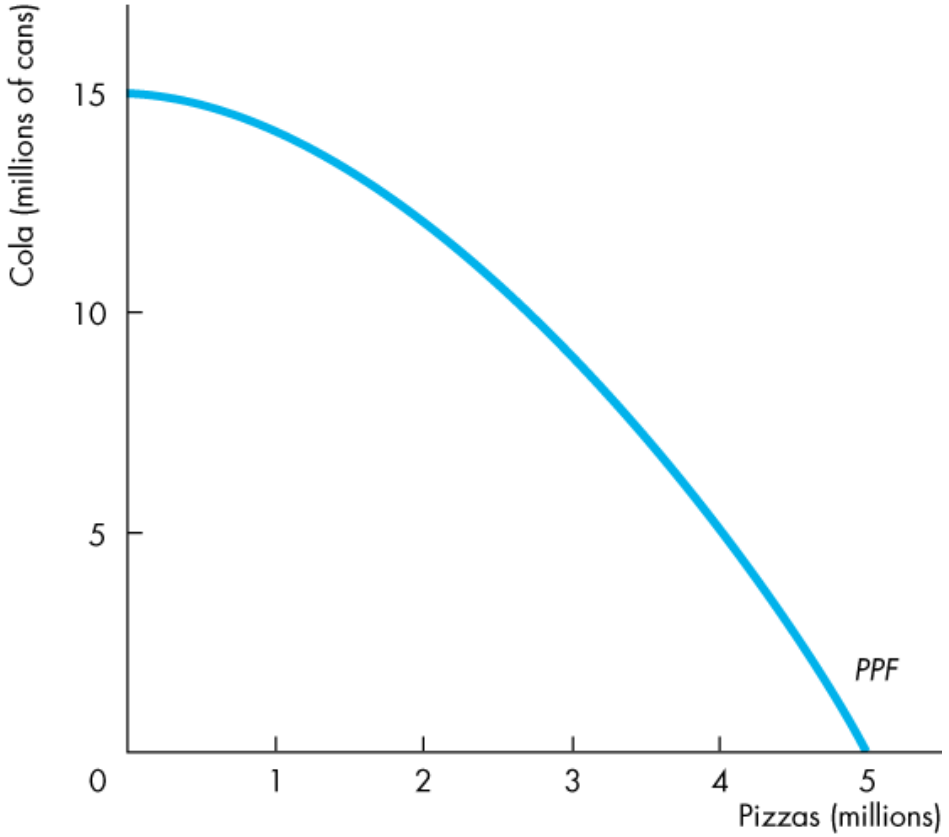
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Production Possibilities and Opportunity Cost

Increasing Opportunity Cost

Because resources are not equally productive in all activities, the *PPF* bows outward.

The outward bow of the *PPF* means that as the quantity produced of each good increases, so does its opportunity cost.



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Using Resources Efficiently

All the points along the *PPF* are efficient.

To determine which of the alternative efficient quantities to produce, we compare costs and benefits.

The *PPF* and Marginal Cost

The *PPF* determines opportunity cost.

The **marginal cost** of a good or service is the opportunity cost of producing *one more unit* of it.

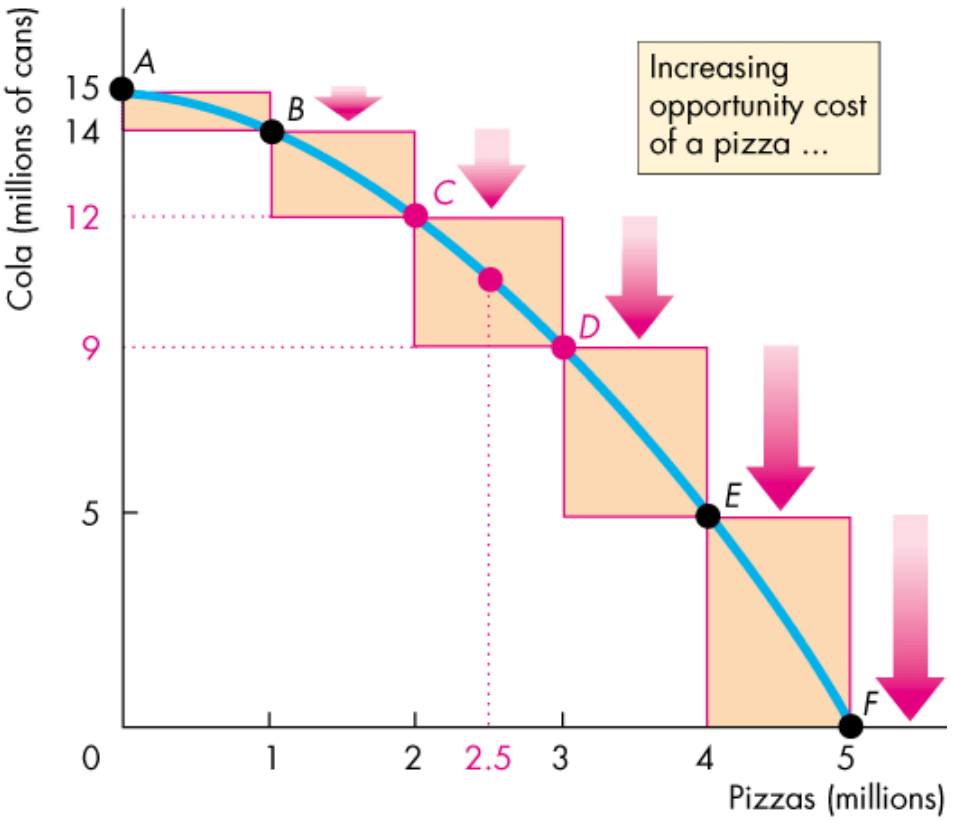
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Using Resources Efficiently

Figure 2.2 illustrates the marginal cost of a pizza.

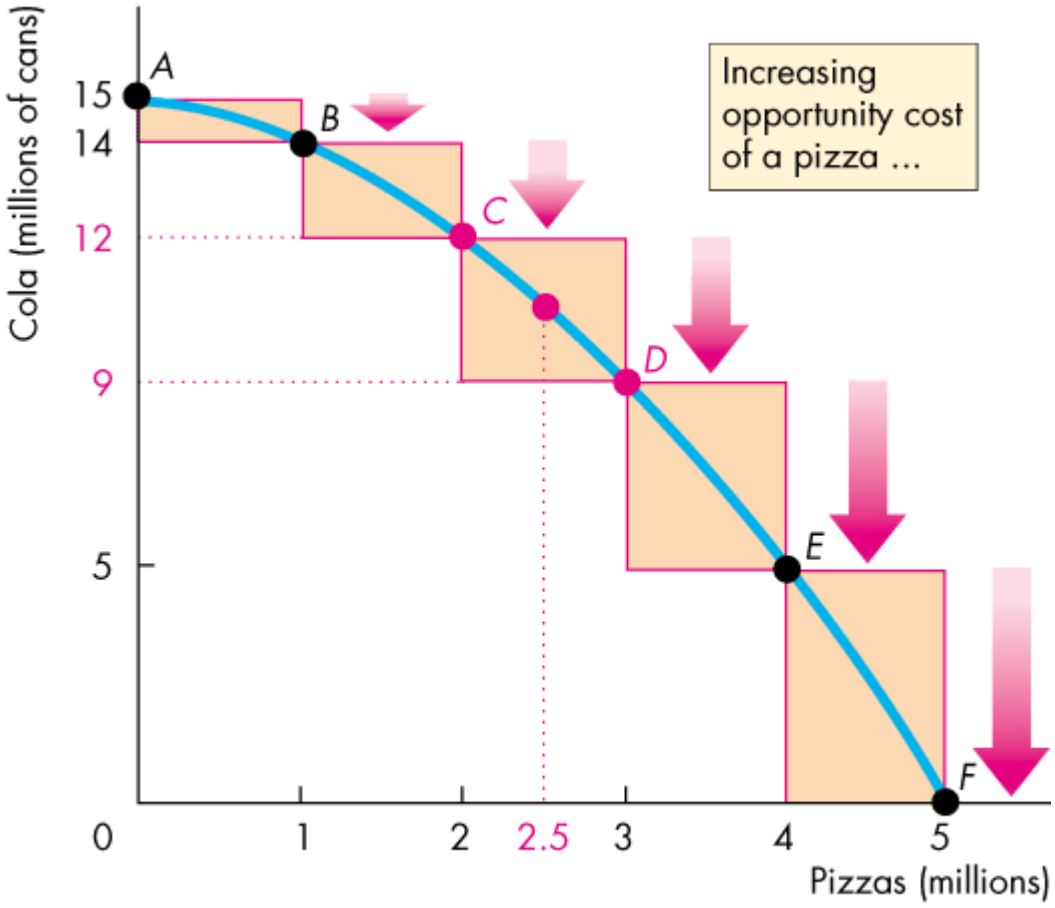
As we move along the *PPF*, the opportunity cost of a pizza increases.

The opportunity cost of producing one more pizza is the marginal cost of a pizza.



(a) *PPF* and opportunity cost

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(a) *PPF* and opportunity cost

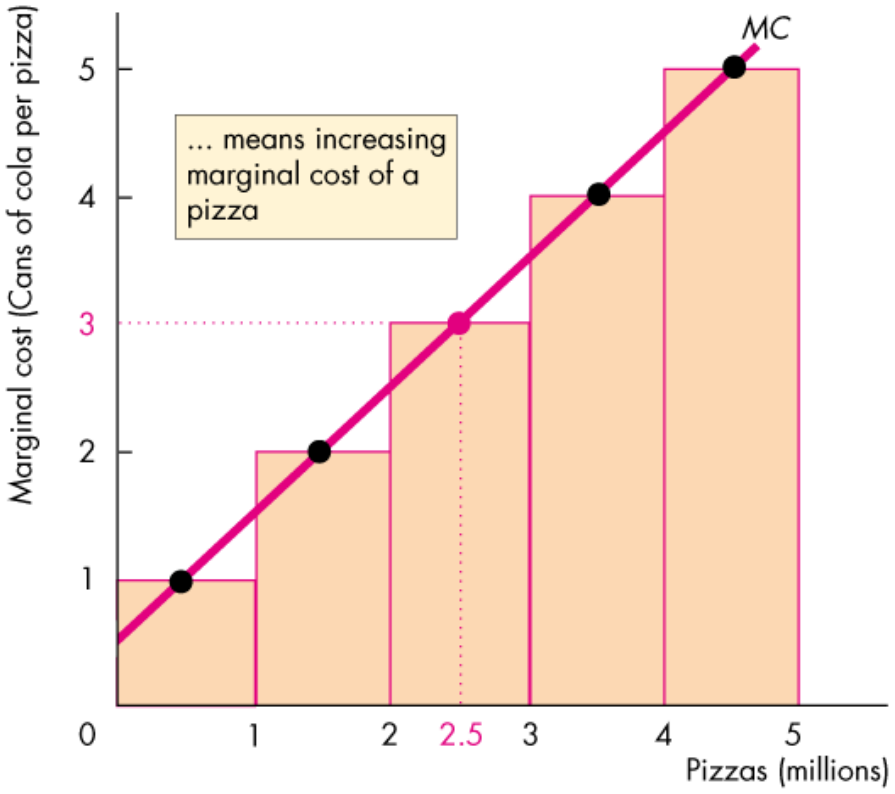
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Using Resources Efficiently

In part (b) of Fig. 2.2, the bars illustrate the increasing opportunity cost of a pizza.

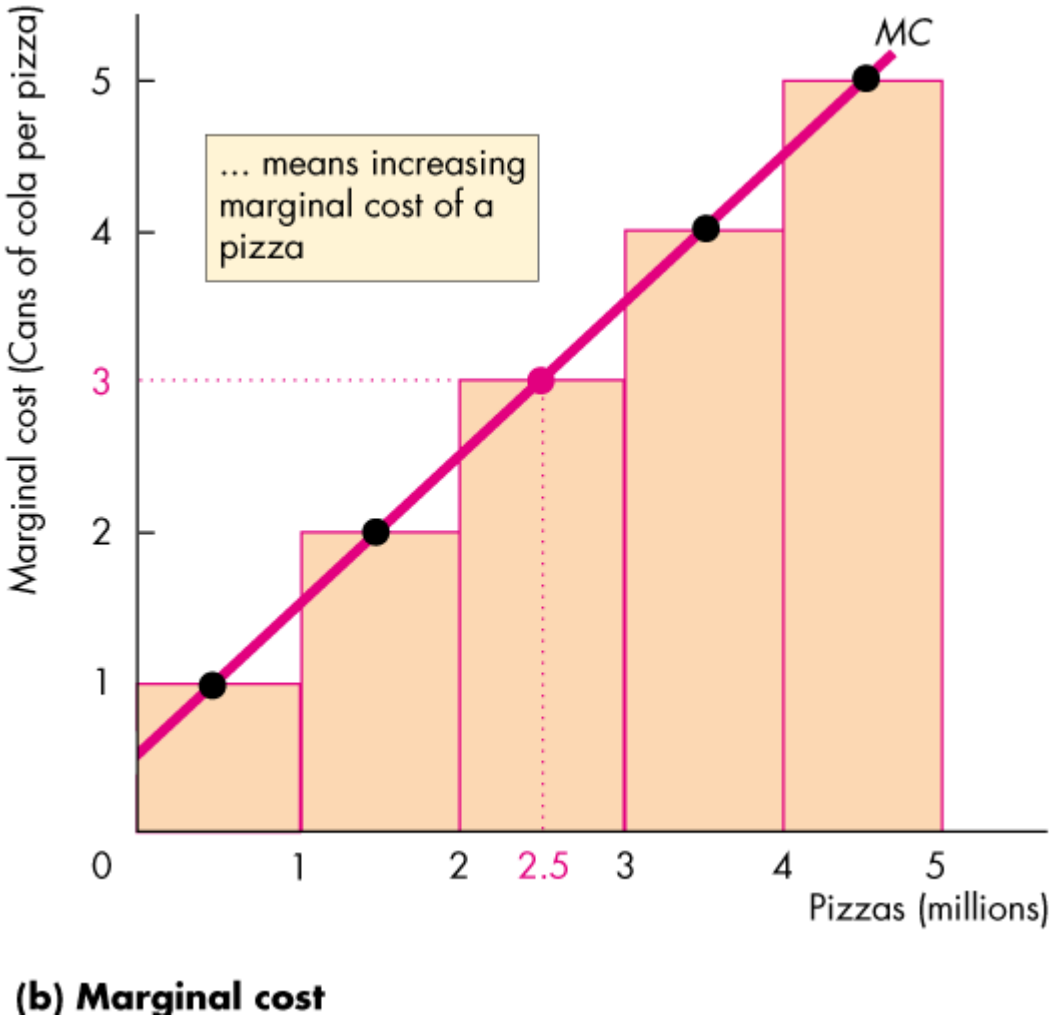
The black dots and the line *MC* show the marginal cost of producing a pizza.

The *MC* curve passes through the middle point of each bar.



(b) Marginal cost

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(b) Marginal cost

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Using Resources Efficiently

Preferences and Marginal Benefit

Preferences are a description of a person's likes and dislikes.

To describe preferences, economists use the concepts of marginal benefit and the marginal benefit curve.

The **marginal benefit** of a good or service is the benefit received from consuming one more unit of it.

We measure marginal benefit by the amount that a person is *willing to pay* for an additional unit of a good or service.

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Using Resources Efficiently

It is a general principle that:

The more we have of any good, the smaller is its marginal benefit and …

the less we are willing to pay for an additional unit of it.

We call this general principle the *principle of decreasing marginal benefit*.

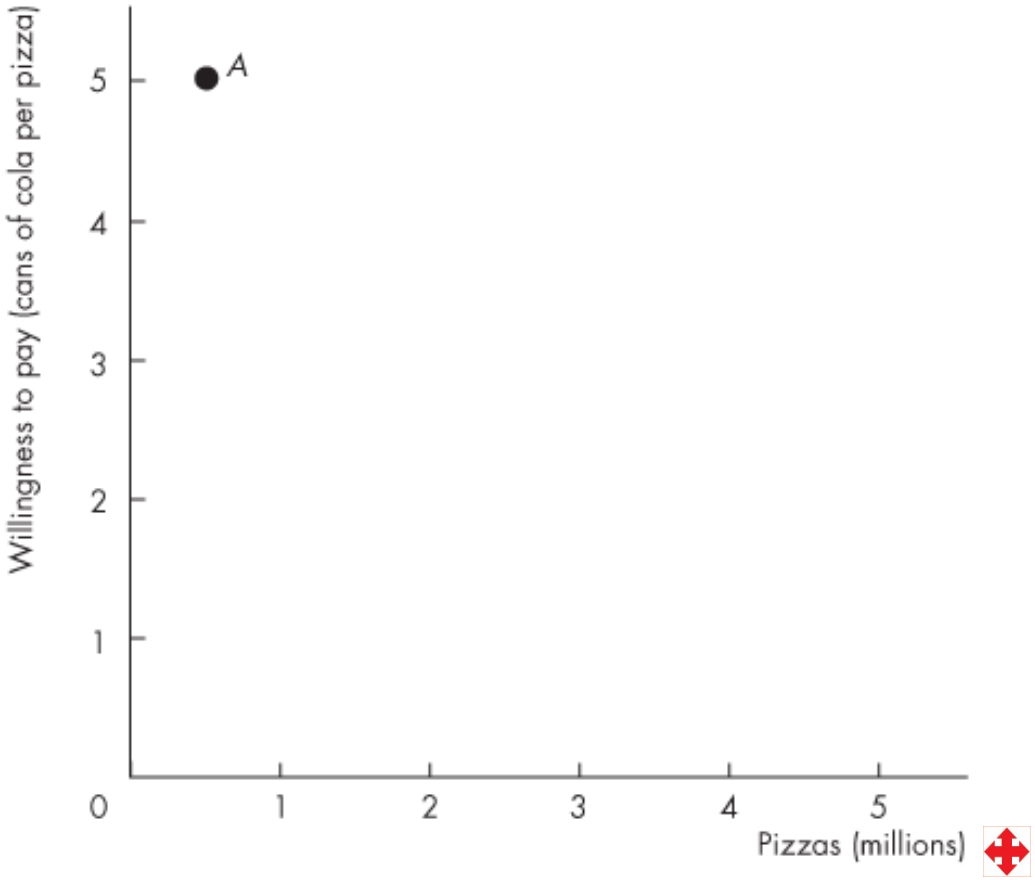
The **marginal benefit curve** shows the relationship between the marginal benefit of a good and the quantity of that good consumed.

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Using Resources Efficiently

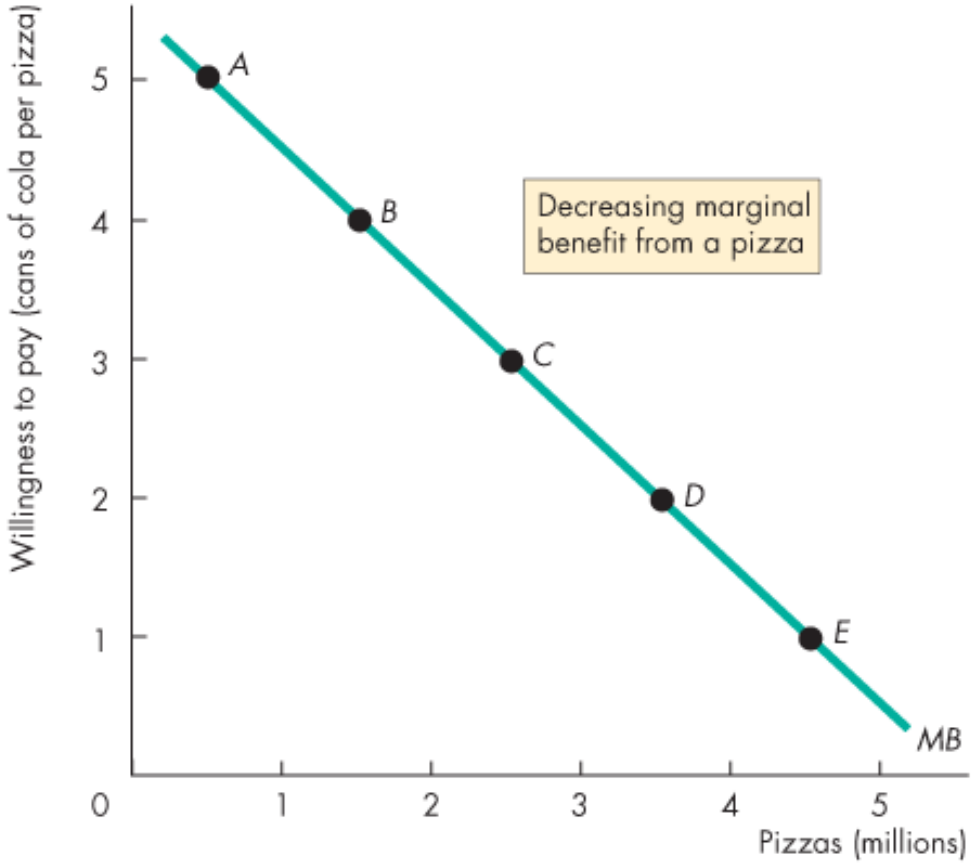
At point *A*, with 0.5 million pizzas available, people are willing to pay 5 cans of cola for a pizza.

Possibility	Pizzas (millions)	Willingness to pay (cans of cola per pizza)
A	0.5	5



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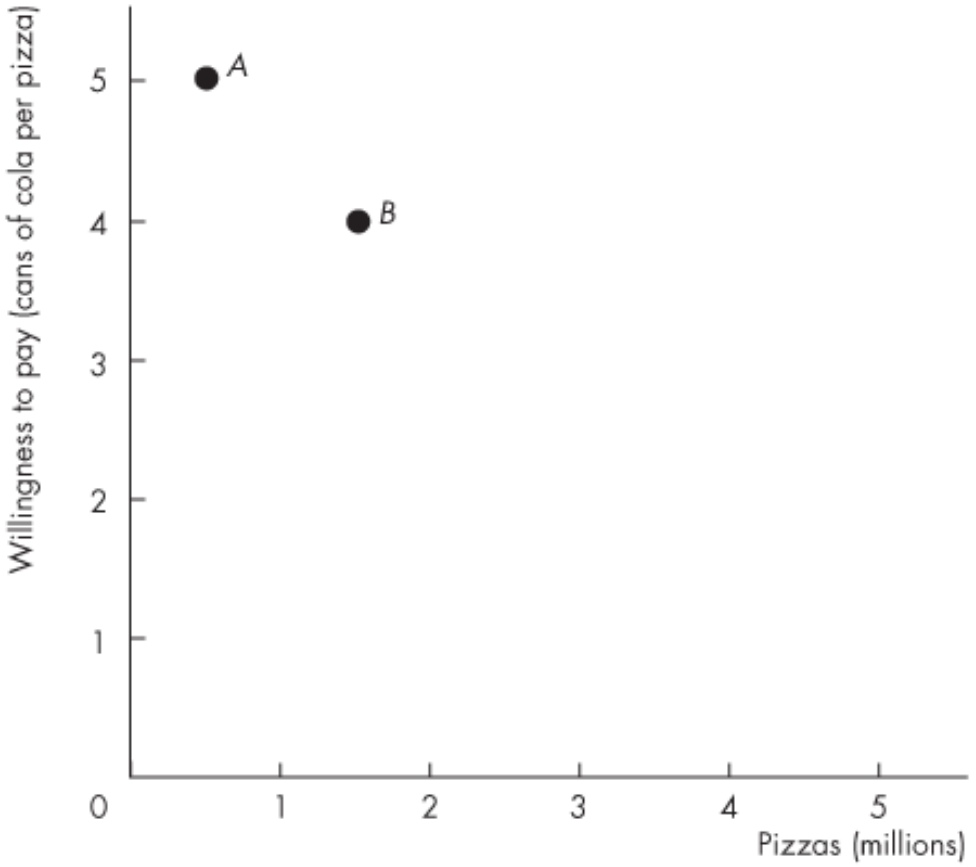
Possibility	Pizzas (millions)	Willingness to pay (cans of cola per pizza)
A	0.5	5
B	1.5	4
C	2.5	3
D	3.5	2
E	4.5	1



Using Resources Efficiently

At point *B*, with 1.5 million pizzas available, people are willing to pay 4 cans of cola for a pizza

Possibility	Pizzas (millions)	Willingness to pay (cans of cola per pizza)
A	0.5	5
B	1.5	4

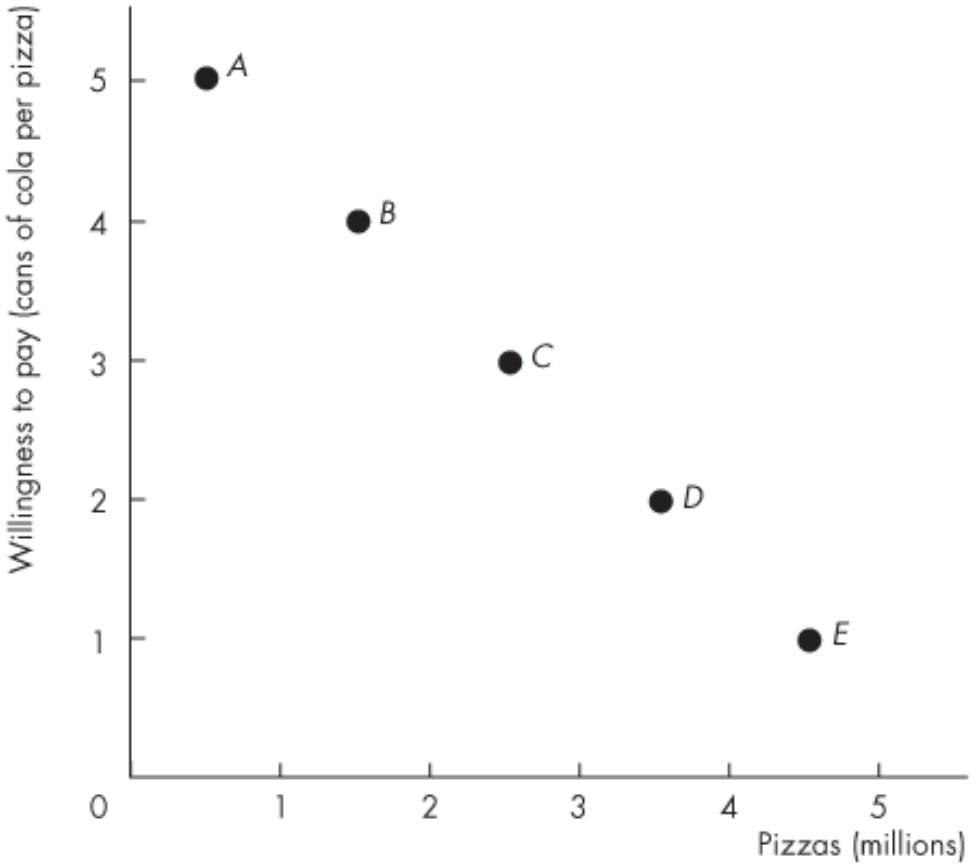


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Using Resources Efficiently

At point *E*, with 4.5 million pizzas available, people are willing to pay 1 can of cola for a pizza.

Possibility	Pizzas (millions)	Willingness to pay (cans of cola per pizza)
A	0.5	5
B	1.5	4
C	2.5	3
D	3.5	2
E	4.5	1

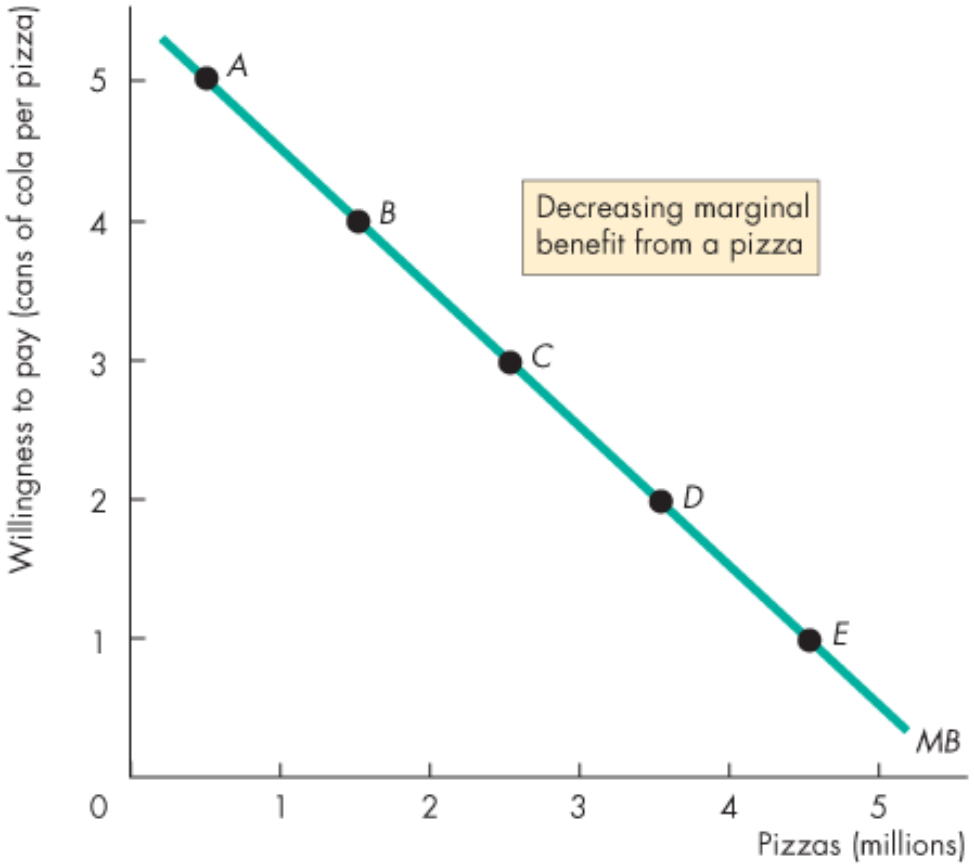


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Using Resources Efficiently

The line through the points shows the marginal benefit from a pizza.

Possibility	Pizzas (millions)	Willingness to pay (cans of cola per pizza)
A	0.5	5
B	1.5	4
C	2.5	3
D	3.5	2
E	4.5	1



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Using Resources Efficiently

Allocative Efficiency

When we cannot produce more of any one good without giving up some other good, we have achieved *production efficiency.*

We are producing at a point *on* the *PPF*.

When we cannot produce more of any one good without giving up some other good *that we value more highly*, we have achieved **allocative efficiency**.

We are producing at *the* point on the *PPF* that we prefer above all other points.

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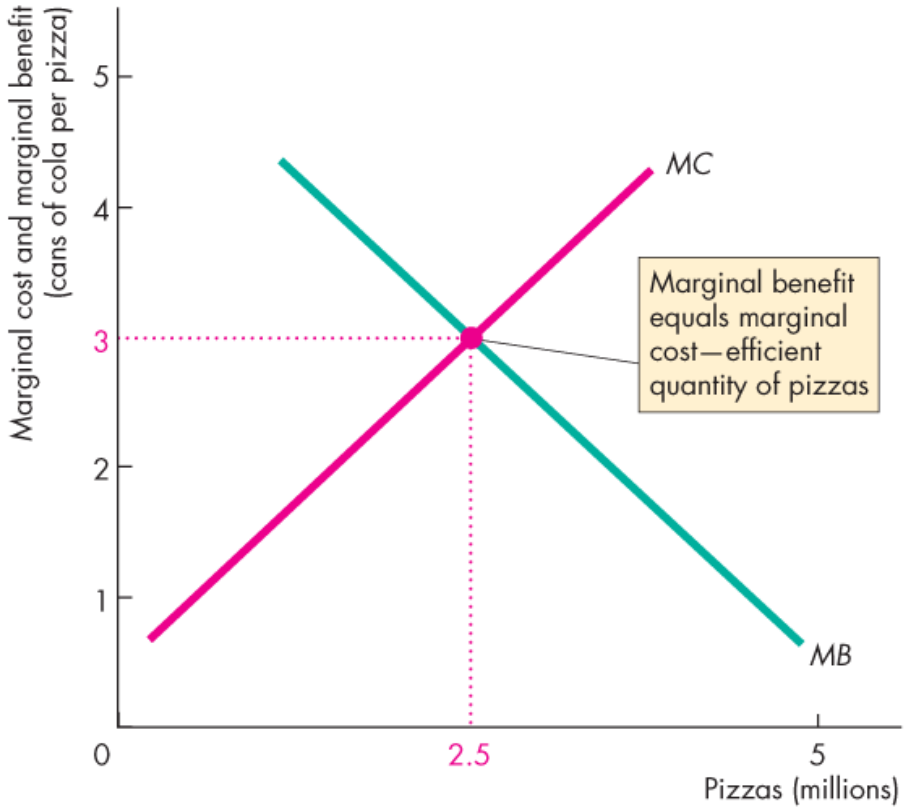
Using Resources Efficiently

Figure 2.4 illustrates allocative efficiency.

The point of allocative efficiency is the point on the *PPF* at which marginal benefit equals marginal cost.

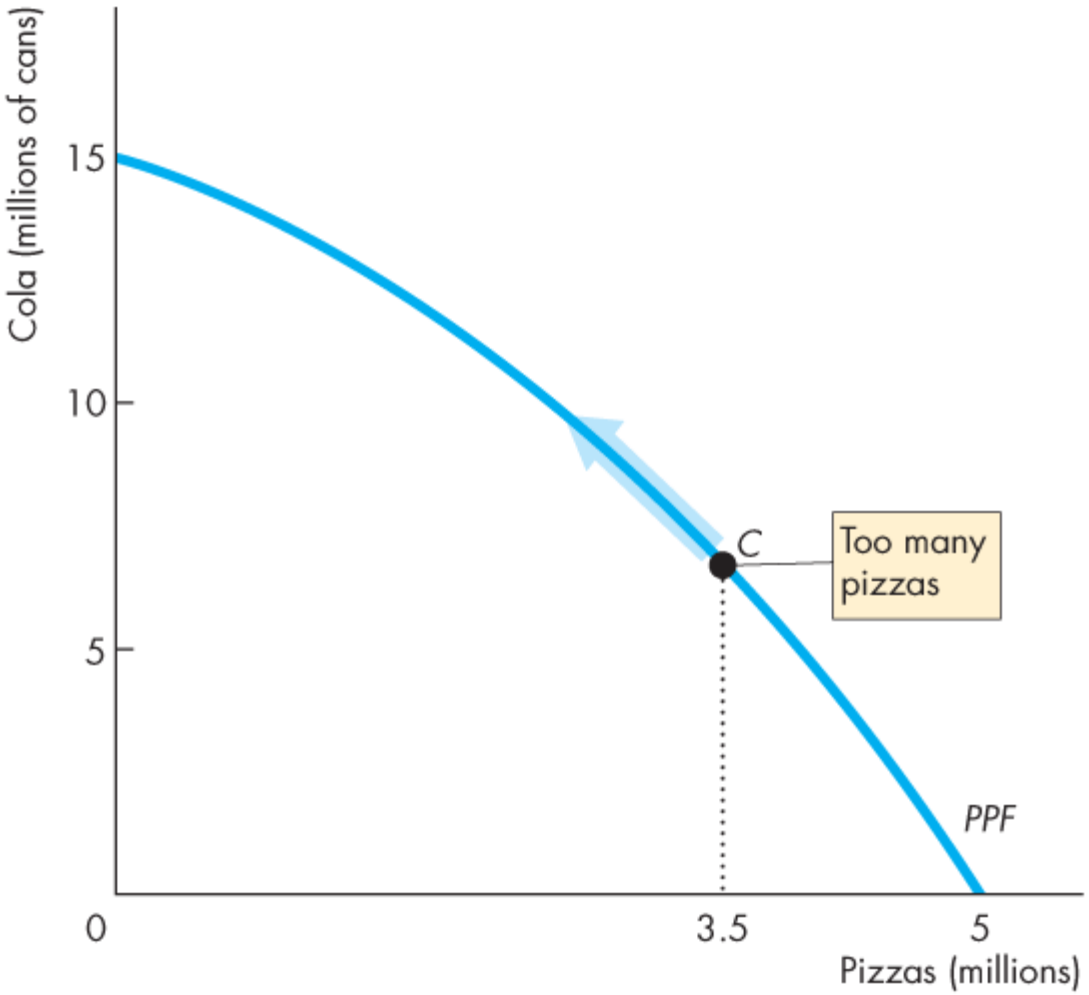
This point is determined by the quantity at which the marginal benefit curve intersects the marginal cost curve.

The efficient quantity is 2.5 million pizzas.



(b) Marginal benefit equals marginal cost

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(a) On the *PPF*

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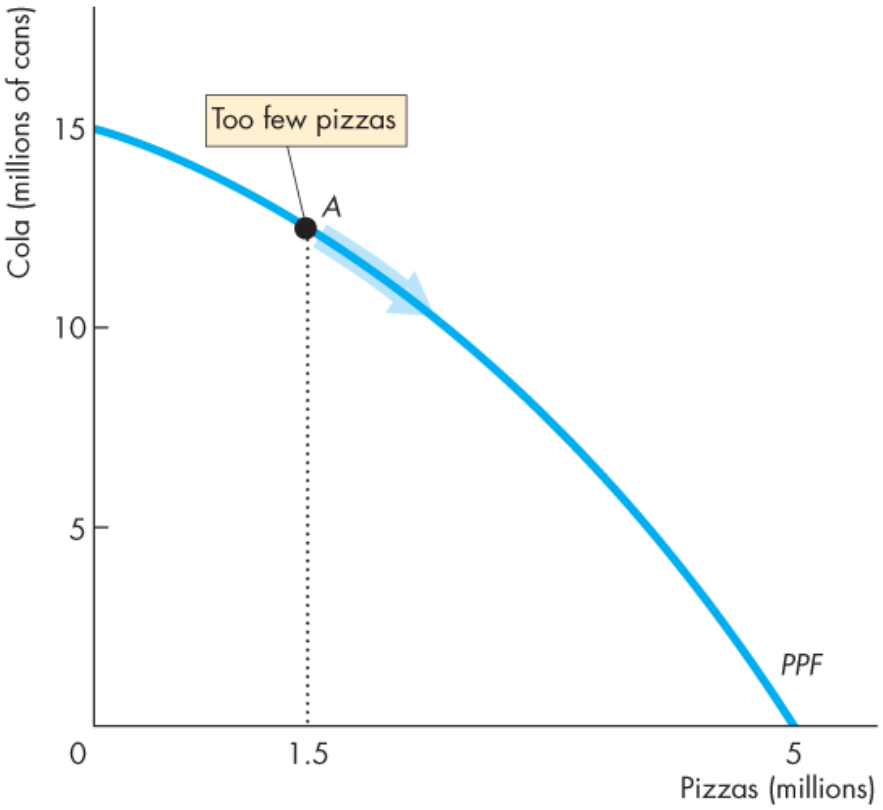
Using Resources Efficiently

If we produce 1.5 million pizzas, marginal benefit exceeds marginal cost.

We get more value from our resources by producing more pizzas.

On the *PPF* at point *A*, we produce too few pizzas

We are better off moving along the *PPF* to produce more pizzas.



(a) On the *PPF*

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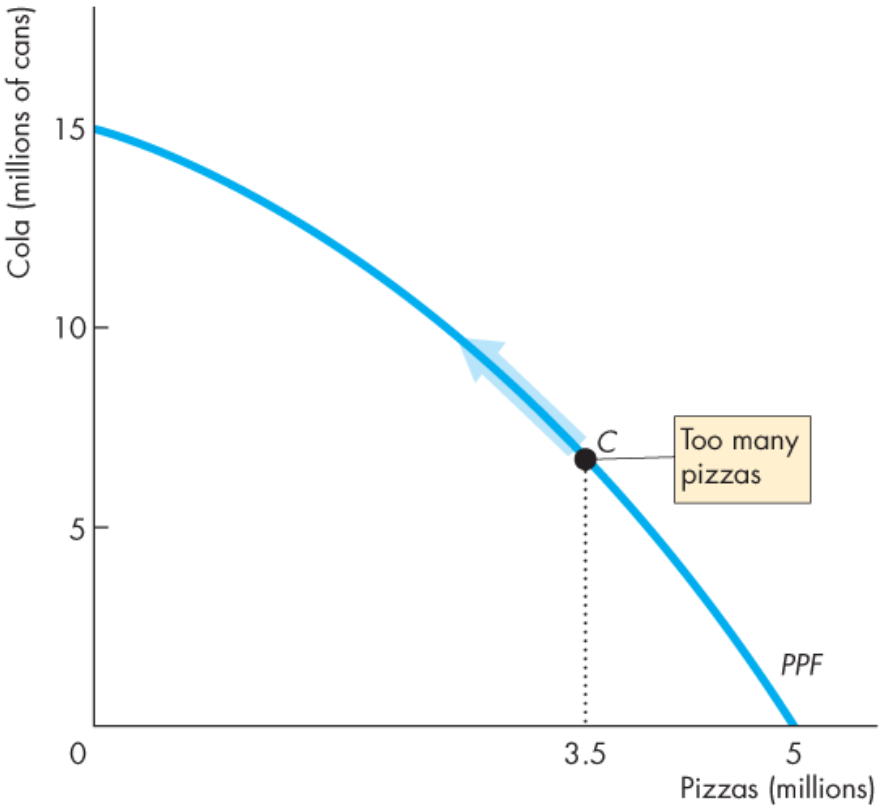
Using Resources Efficiently

If we produce 3.5 million pizzas, marginal cost exceeds marginal benefit.

We get more value from our resources by producing fewer pizzas.

On the *PPF* at point *C*, we produce too many pizzas.

We are better off moving along the *PPF* to produce fewer pizzas.



(a) On the *PPF*

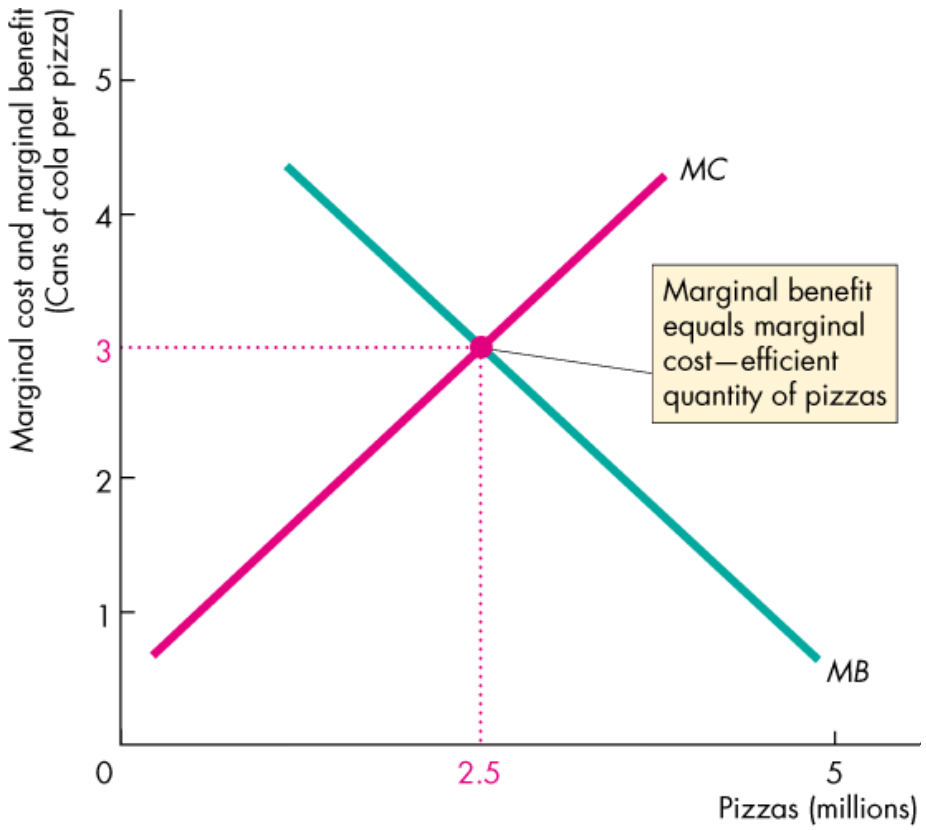
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Using Resources Efficiently

On the *PPF* at point *B*, we are producing the efficient quantities of pizzas and cola.

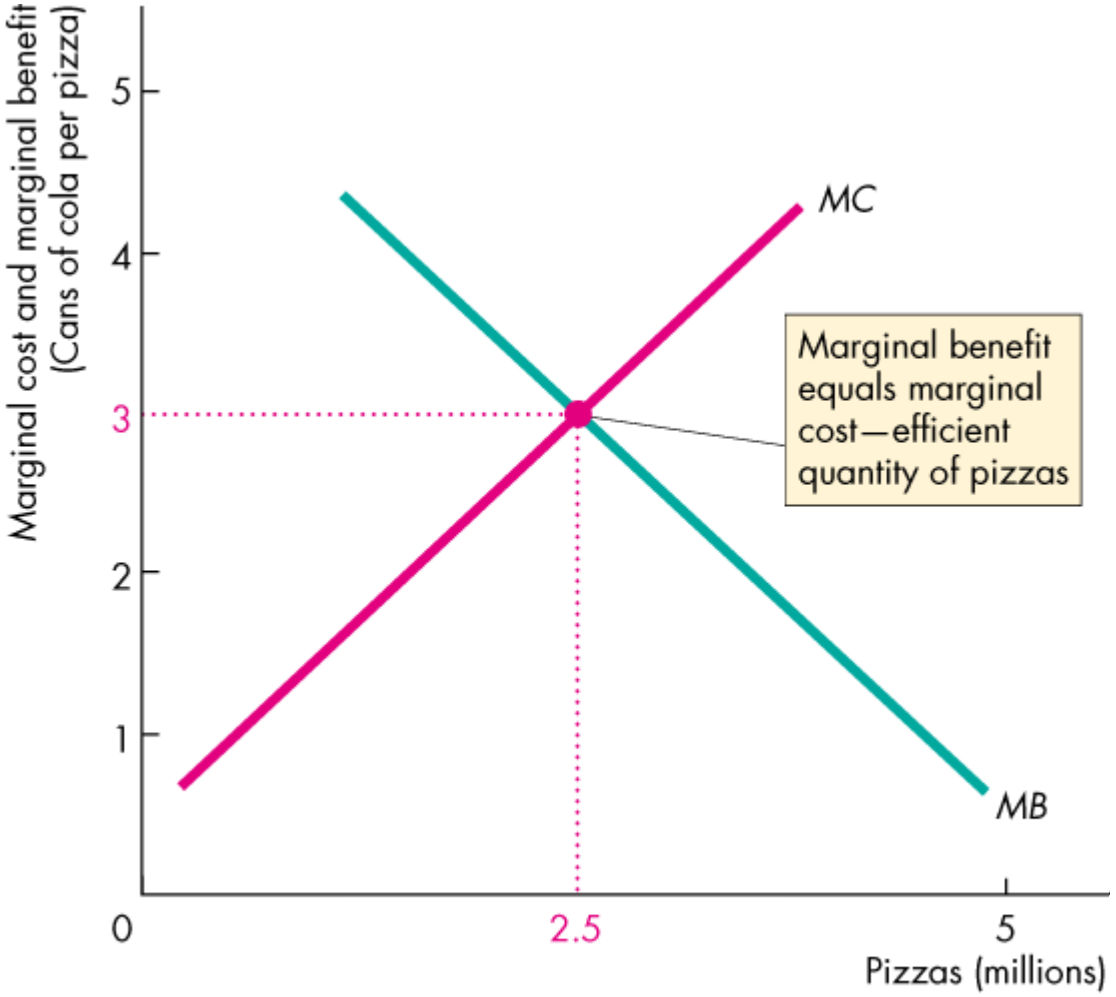
If we produce exactly 2.5 million pizzas, marginal cost equals marginal benefit.

We cannot get more value from our resources.



(b) Marginal benefit equals marginal cost

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(b) Marginal benefit equals marginal cost

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Gains from Trade

Comparative Advantage and Absolute Advantage

A person has a **comparative advantage** in an activity if that person can perform the activity at a lower opportunity cost than anyone else.

A person has an **absolute advantage** if that person is more productive than others.

Absolute advantage involves comparing productivities while comparative advantage involves comparing opportunity costs.

Let's look at Joe and Liz who operate smoothie bars.

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Gains from Trade

Joe's Smoothie Bar

In an hour, Joe can produce 6 smoothies or 30 salads.

Joe's opportunity cost of producing 1 smoothie is 5 salads.

TABLE 2.1 Joe's Production Possibilities

Item	Minutes to produce 1	Quantity per hour
Smoothies	10	6
Salads	2	30

Joe's opportunity cost of producing 1 salad is 1/5 smoothie.

Joe spends 10 minutes making salads and 50 minutes making smoothies, so he produces 5 smoothies and 5 salads an hour.

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Gains from Trade

Liz's Smoothie Bar

In an hour, Liz can produce 30 smoothies or 30 salads.

Liz's opportunity cost of producing 1 smoothie is 1 salad.

TABLE 2.2 Liz's Production Possibilities

Item	Minutes to produce 1	Quantity per hour
Smoothies	2	30
Salads	2	30

Liz's opportunity cost of producing 1 salad is 1 smoothie.

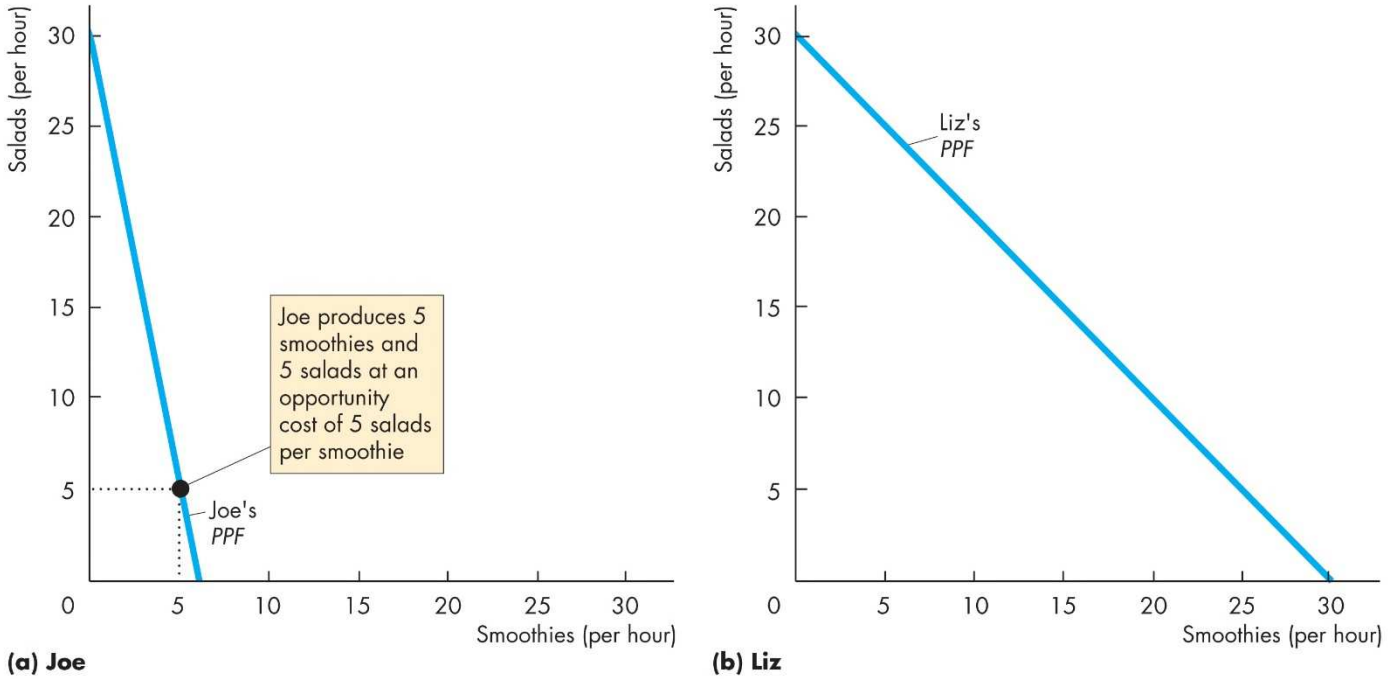
Liz's customers buy salads and smoothies in equal number, so she produces 15 smoothies and 15 salads an hour.

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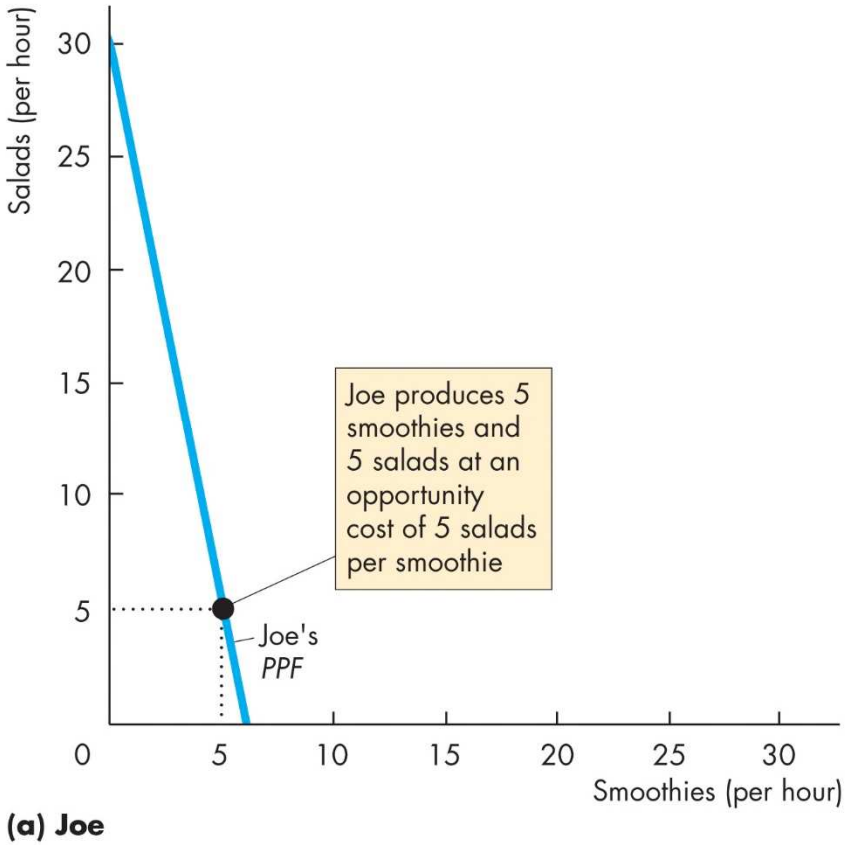
Gains from Trade

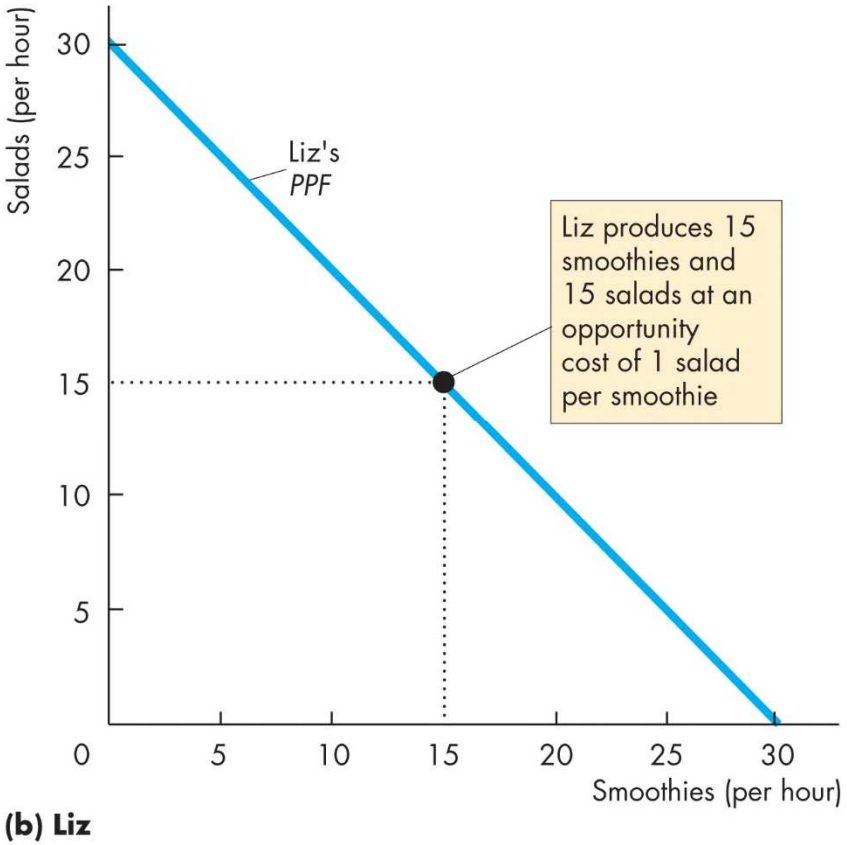
Figure 2.5 shows the production possibility frontiers.

In part (a), Joe's opportunity cost of a smoothie is 5 salads. Joe produces at point *A* on his *PPF.*



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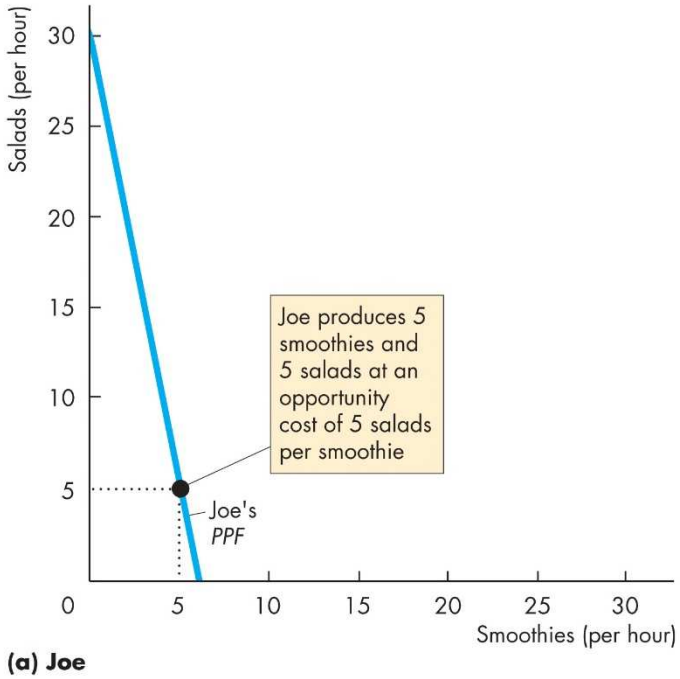


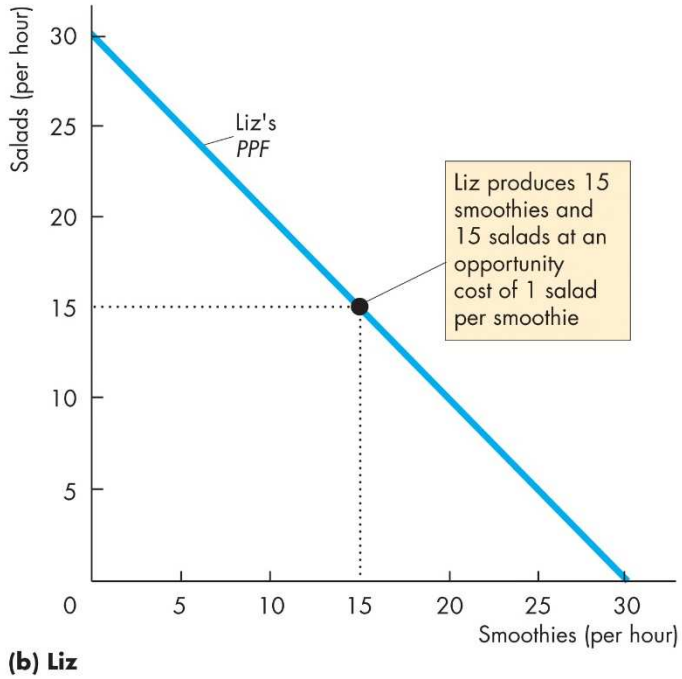


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Gains from Trade

In part (b), Liz's opportunity cost of a smoothie is 1 salad. Liz produces at point *A* on her *PPF.*





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Gains from Trade

Joe's Comparative Advantage

Joe's opportunity cost of a salad is 1/5 smoothie.

Liz's opportunity cost of a salad is 1 smoothie.

Joe's opportunity cost of a salad is less than Liz's.

So Joe has a comparative advantage in producing salads.

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Gains from Trade

Liz's Comparative Advantage

Liz's opportunity cost of a smoothie is 1 salad.

Joe's opportunity cost of a smoothie is 5 salads.

Liz's opportunity cost of a smoothie is less than Joe's.

So Liz has a comparative advantage in producing smoothies.

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Gains from Trade

Achieving the Gains from Trade

Liz and Joe produce the good in which they have a comparative advantage:

- Liz produces 30 smoothies and 0 salads.
- Joe produces 30 salads and 0 smoothies.

TABLE 2.3 Liz and Joe Gain from Trade

(a) Before trade	Liz	Joe
Smoothies	15	5
Salads	15	5
(b) Specialization	**Liz**	**Joe**
Smoothies	30	0
Salads	0	30

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TABLE 2.3 Liz and Joe Gain from Trade

(a) Before trade	Liz	Joe
Smoothies	15	5
Salads	15	5
(b) Specialization	**Liz**	**Joe**
Smoothies	30	0
Salads	0	30
(c) Trade	**Liz**	**Joe**
Smoothies	sell 10	buy 10
Salads	buy 20	sell 20
(d) After trade	**Liz**	**Joe**
Smoothies	20	10
Salads	20	10
(e) Gains from trade	**Liz**	**Joe**
Smoothies	+5	+5
Salads	+5	+5

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Gains from Trade

Liz and Joe trade:

- Liz sells Joe 10 smoothies and buys 20 salads.
- Joe sells Liz 20 salads and buys 10 smoothies.

After trade:

- Liz has 20 smoothies and 20 salads.
- Joe has 10 smoothies and 10 salads.

TABLE 2.3 Liz and Joe Gain from Trade

(a) Before trade	Liz	Joe
Smoothies	15	5
Salads	15	5
(b) Specialization	**Liz**	**Joe**
Smoothies	30	0
Salads	0	30
(c) Trade	**Liz**	**Joe**
Smoothies	sell 10	buy 10
Salads	buy 20	sell 20
(d) After trade	**Liz**	**Joe**
Smoothies	20	10
Salads	20	10

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Gains from Trade

Gains from trade:

- Liz gains 5 smoothies and 5 salads an hour
- Joe gains 5 smoothies and 5 salads an hour

TABLE 2.3 Liz and Joe Gain from Trade

(a) Before trade	Liz	Joe
Smoothies	15	5
Salads	15	5
(b) Specialization	**Liz**	**Joe**
Smoothies	30	0
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(c) Trade	**Liz**	**Joe**
Smoothies	sell 10	buy 10
Salads	buy 20	sell 20
(d) After trade	**Liz**	**Joe**
Smoothies	20	10
Salads	20	10
(e) Gains from trade	**Liz**	**Joe**
Smoothies	+5	+5
Salads	+5	+5

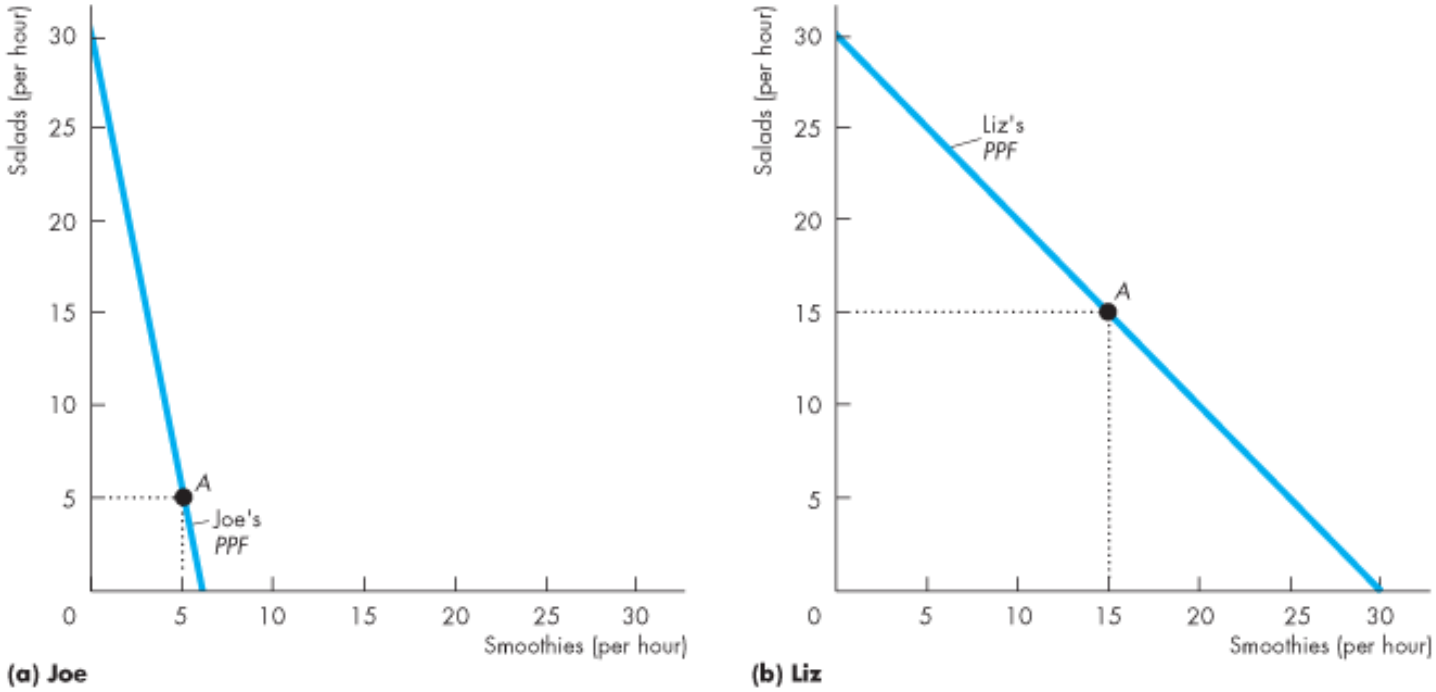
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Gains from Trade

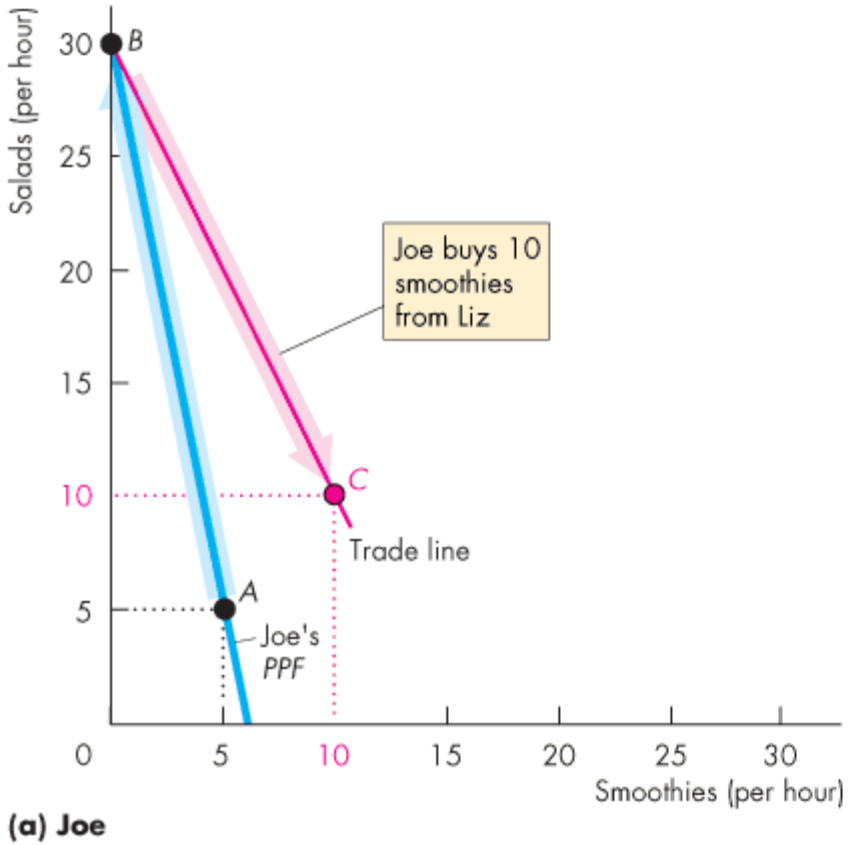
Figure 2.6 shows the gains from trade.

Joe's opportunity cost of producing a salad is less than Liz's.

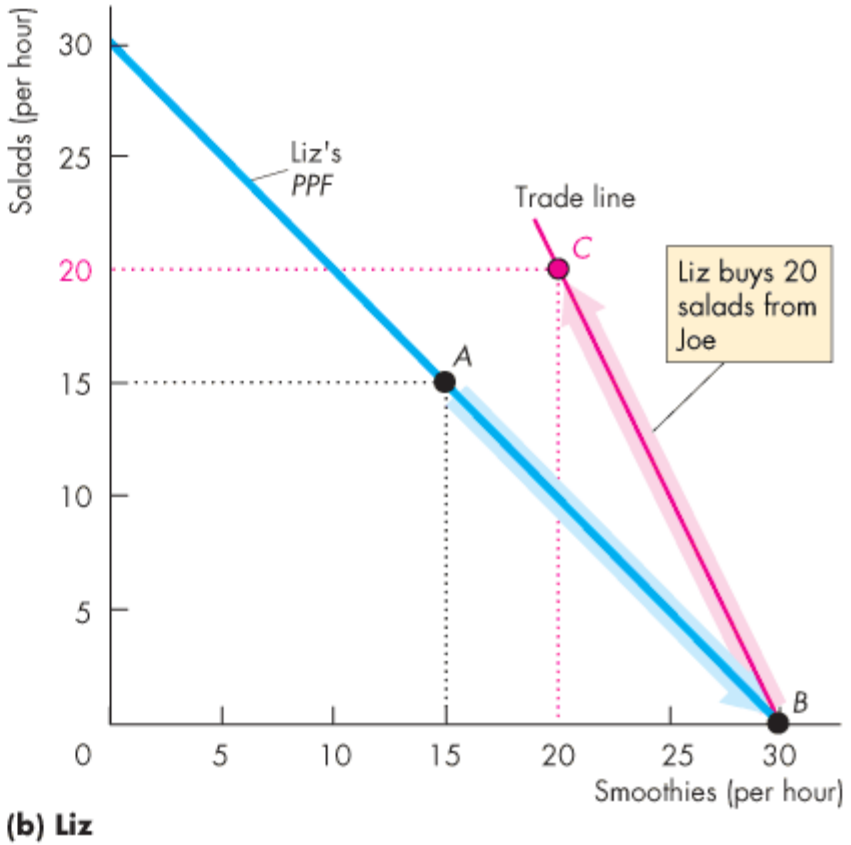
So Joe has a comparative advantage in producing salad.



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(a) Joe



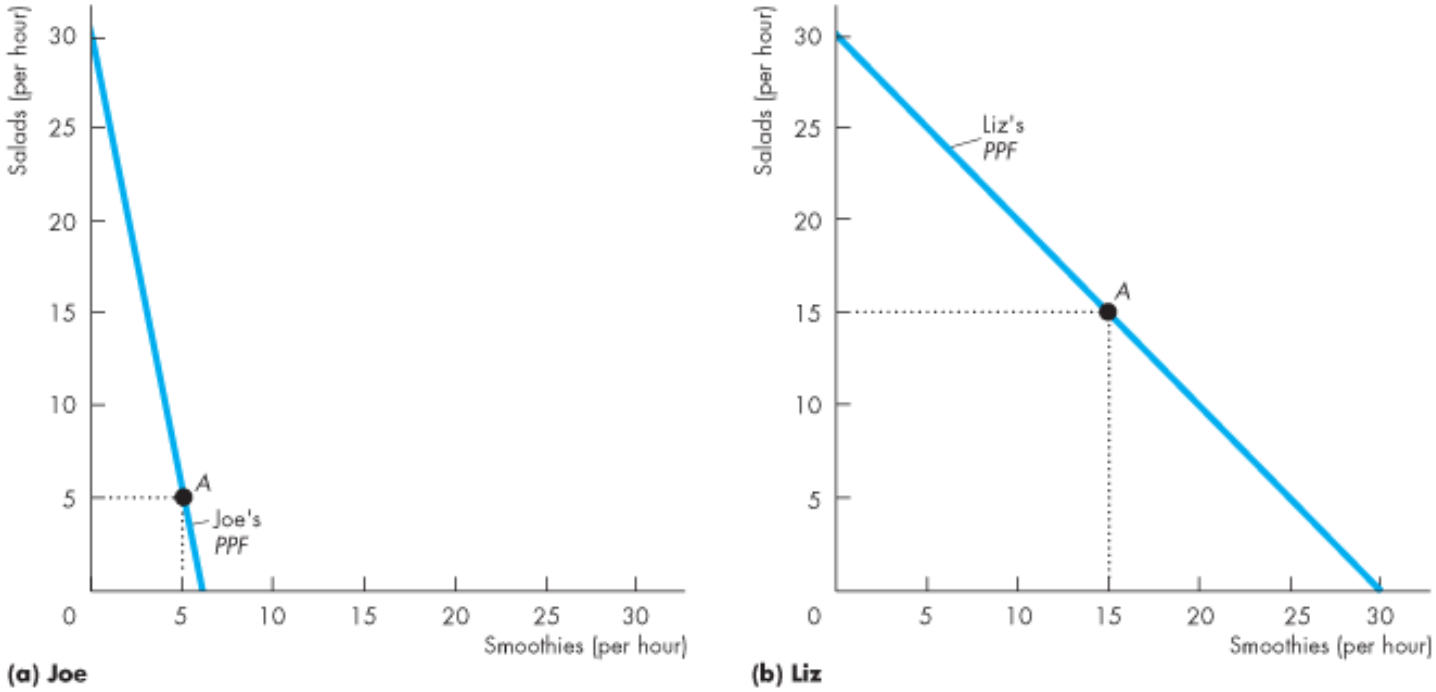
(b) Liz

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Gains from Trade

Liz's opportunity cost of producing a smoothie is less than Joe's.

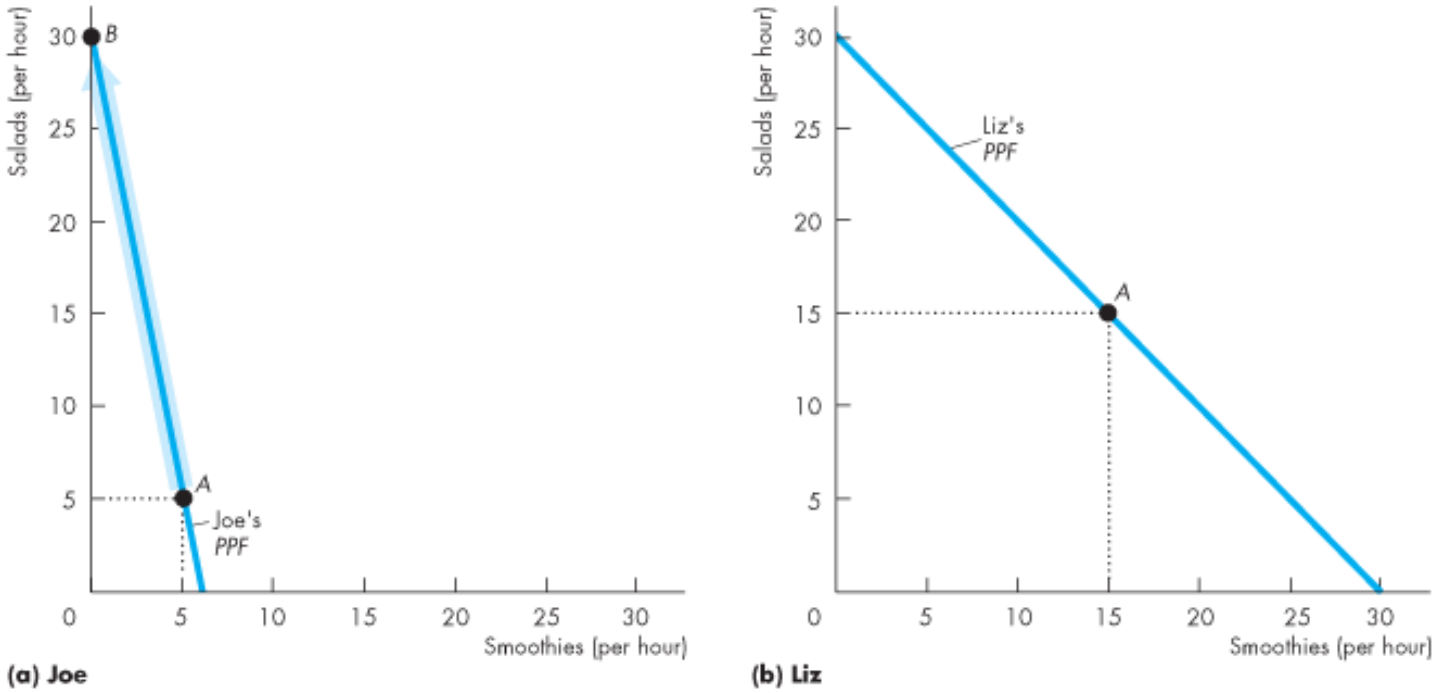
So Liz has a comparative advantage in producing smoothies.



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Gains from Trade

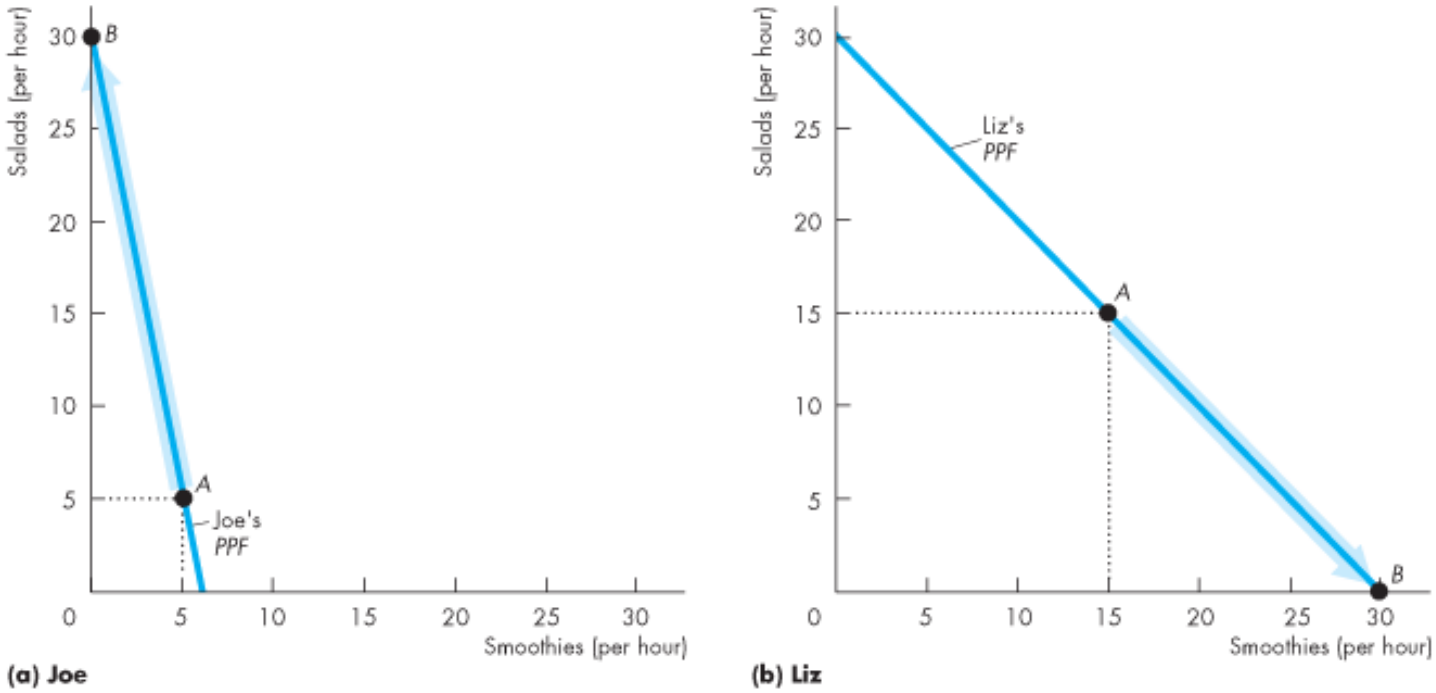
Joe specializes in producing salad and he produces 30 salads an hour at point *B* on his *PPF.*



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Gains from Trade

Liz specializes in producing smoothies and produces 30 smoothies an hour at point *B* on her *PPF.*

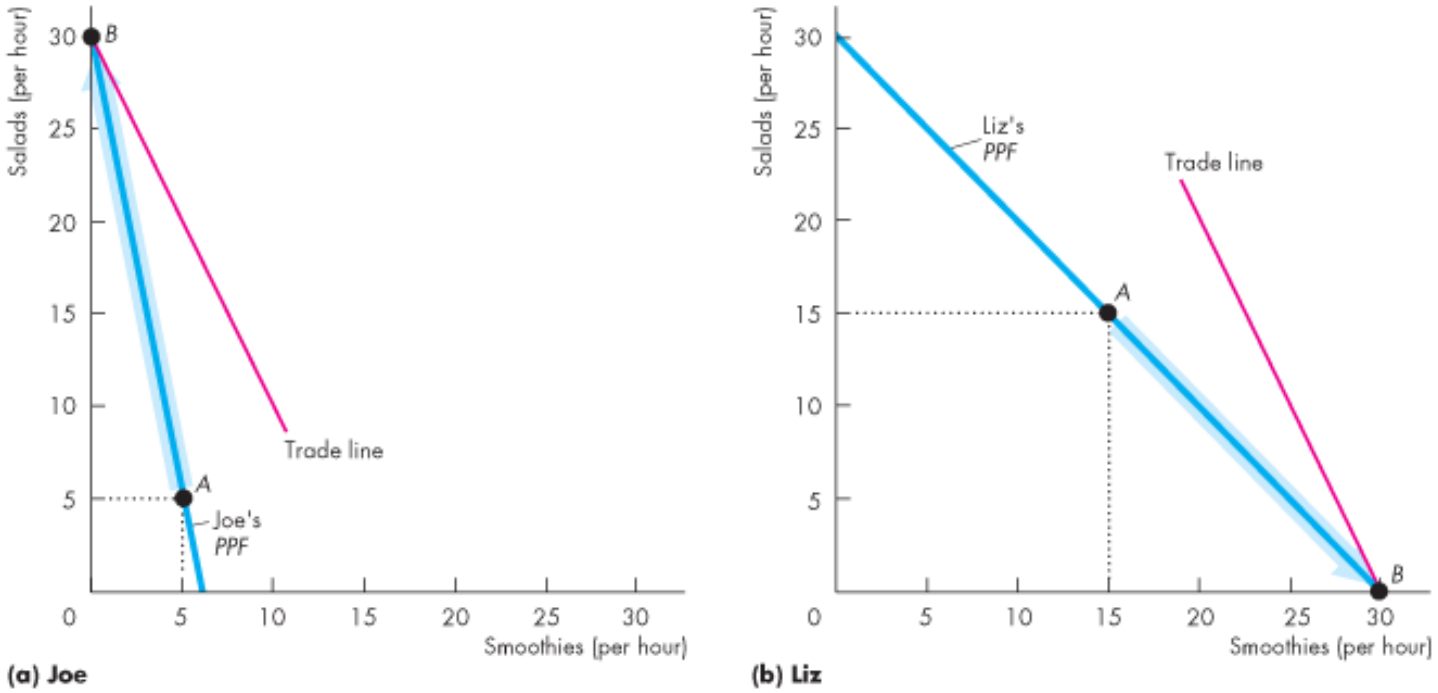


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Gains from Trade

They trade salads for smoothies along the red “Trade line.”

On the trade line, the price of a salad is 2 smoothies or the price of a smoothie is ½ of a salad.

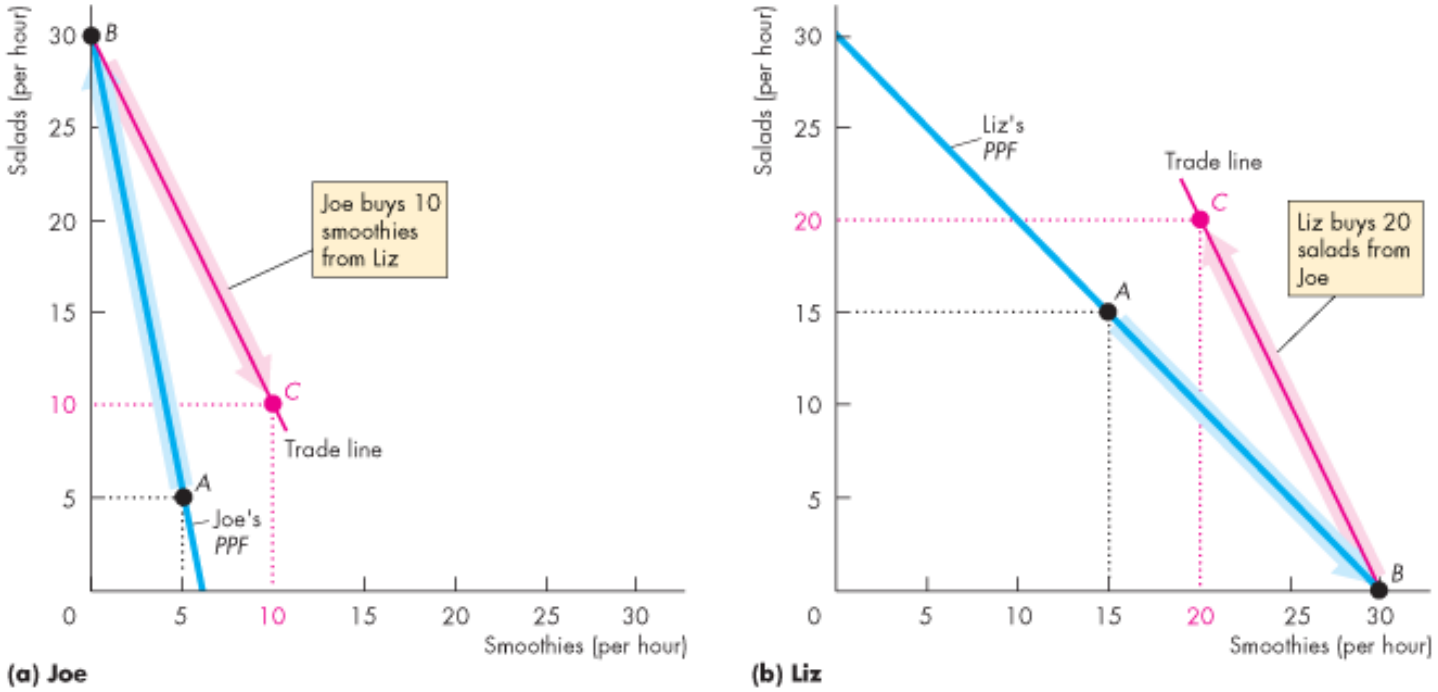


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Gains from Trade

Joe buys smoothies from Liz and moves to point *C*—a point *outside* his *PPF*.

Liz buys salads from Joe and moves to point *C*—a point *outside* her *PPF*.



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Gains from Trade

The Liz-Joe Economy and its *PPF*

With specialization and trade both Liz and Joe get outside their *PPF*s.

If Liz and Joe are the only producers in the economy, what does the economy's *PPF* look like?

Figure 2.7 on the next slide shows the construction of the economy's *PPF*.

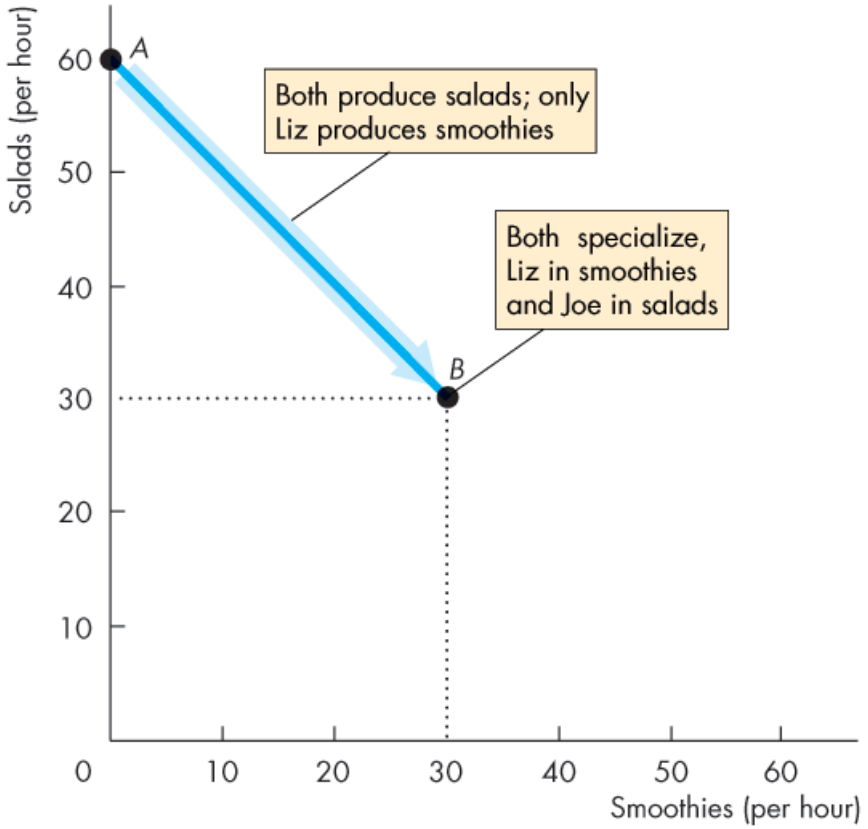
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Gains from Trade

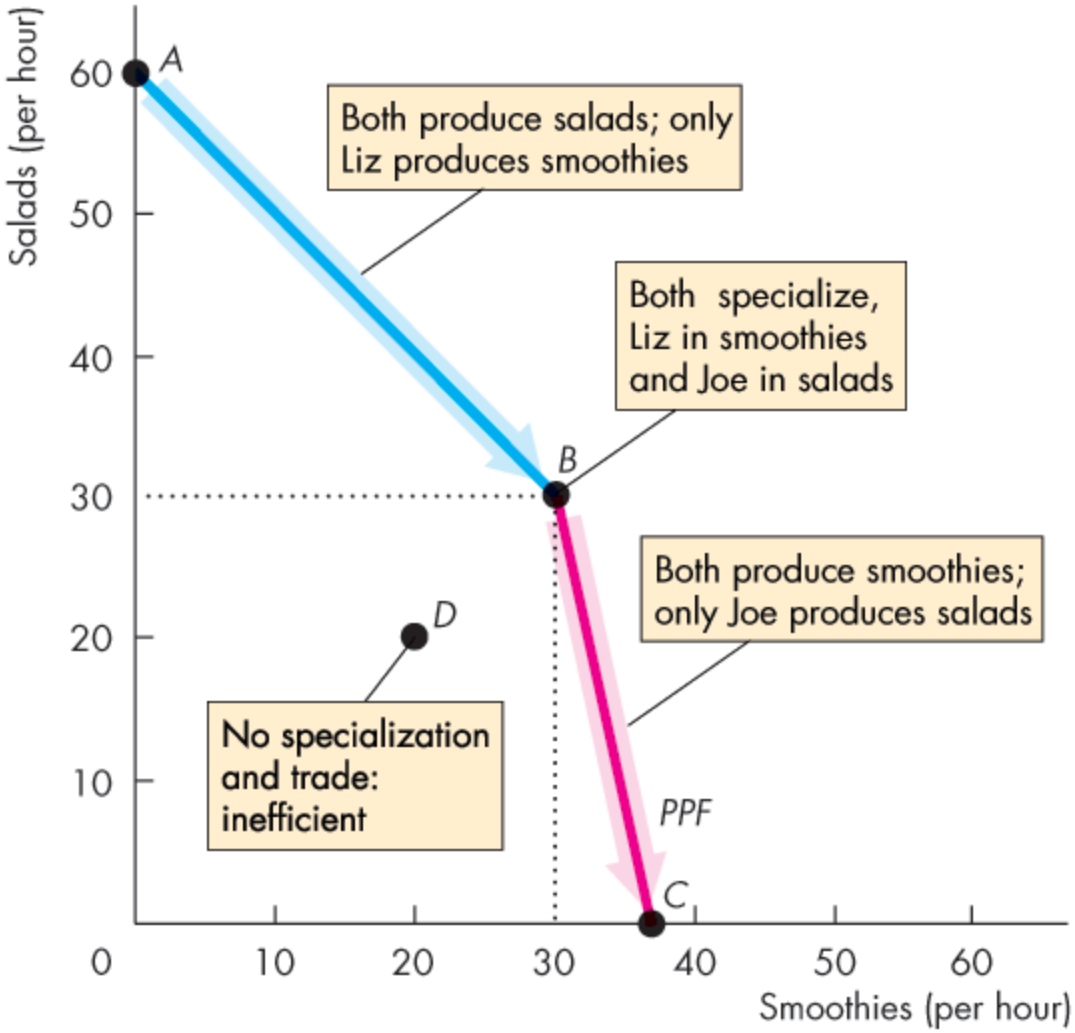
If both produce only salads, the economy produces 60 salads at point *A*.

If the economy starts to produce smoothies, Liz has the comparative advantage in smoothies and produces the first 30 smoothies at a cost of 1 salad per smoothie.

At point *B*, Liz produces 30 smoothies and Joe produces 30 salads.



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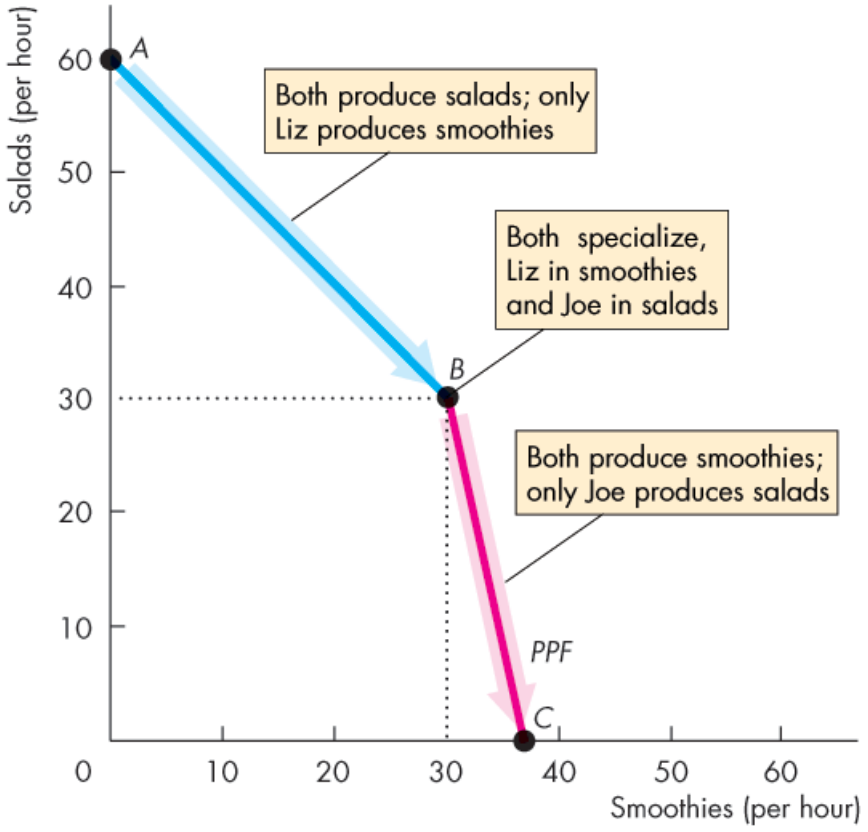
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Gains from Trade

For the economy to produce more than 30 smoothies, Joe will have to produce fewer salads and start producing smoothies.

Joe's cost of producing a smoothie is 5 salads.

If all the economy's resources are used to make smoothies, the economy produces at point *C*.



The outward-kinked curve is the Liz-Joe economy *PPF*.

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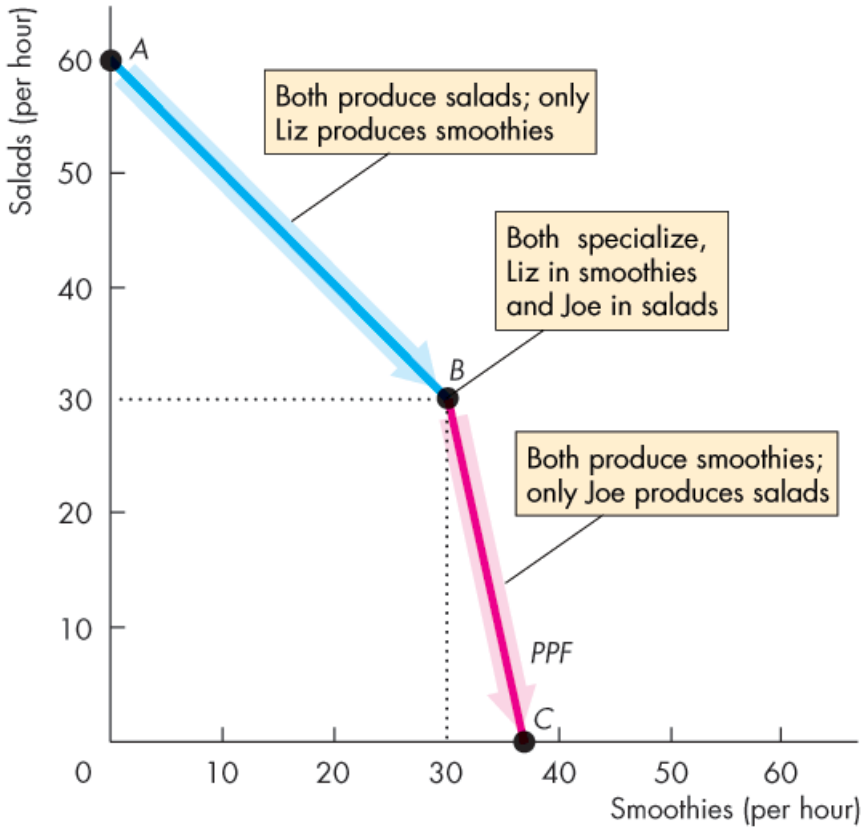
Gains from Trade

Efficiency and Inefficiency

When both Liz and Joe specialize, they produce efficiently at point *B* on the economy's *PPF*.

At all other points on the economy's *PPF*, one person specializes and production is efficient.

Production at any point on the *PPF* is efficient.

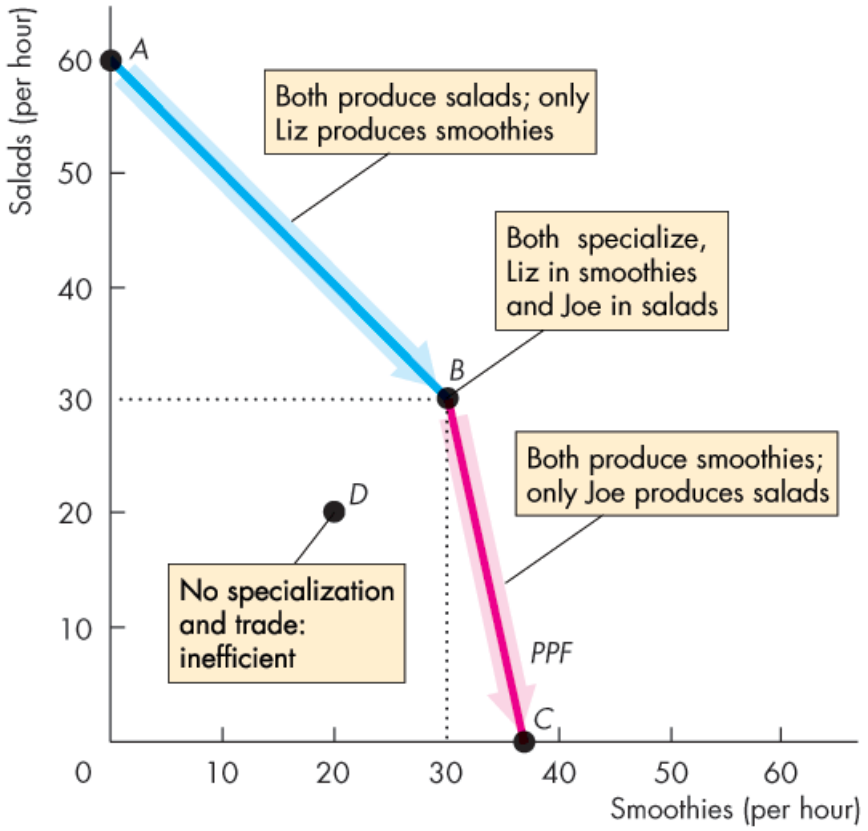


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Gains from Trade

But with no specialization, Joe and Liz produce at a point inside the economy's *PPF*.

Production at point *D* is inefficient.



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Economic Growth

The expansion of production possibilities—an increase in the standard of living—is called **economic growth**.

Two key factors influence economic growth:

- Technological change
- Capital accumulation

Technological change is the development of new goods and of better ways of producing goods and services.

Capital accumulation is the growth of capital resources, which includes *human capital*.

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Economic Growth

The Cost of Economic Growth

To use resources in research and development and to produce new capital, we must decrease our production of consumption goods and services.

So economic growth is not free.

The opportunity cost of economic growth is less current consumption.

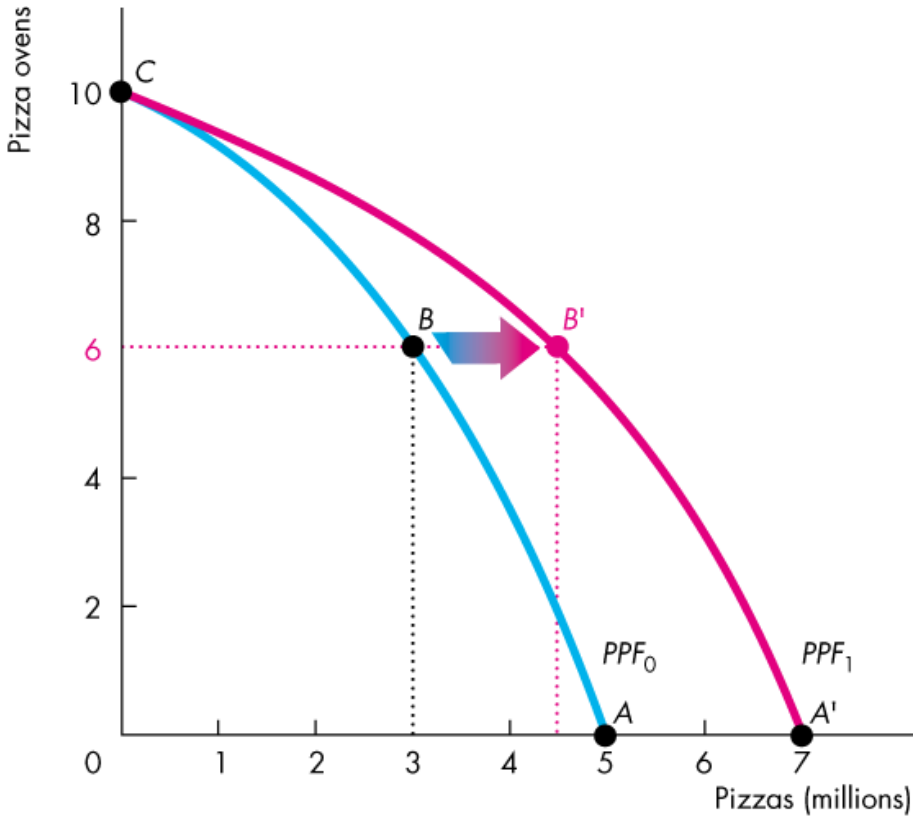
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Economic Growth

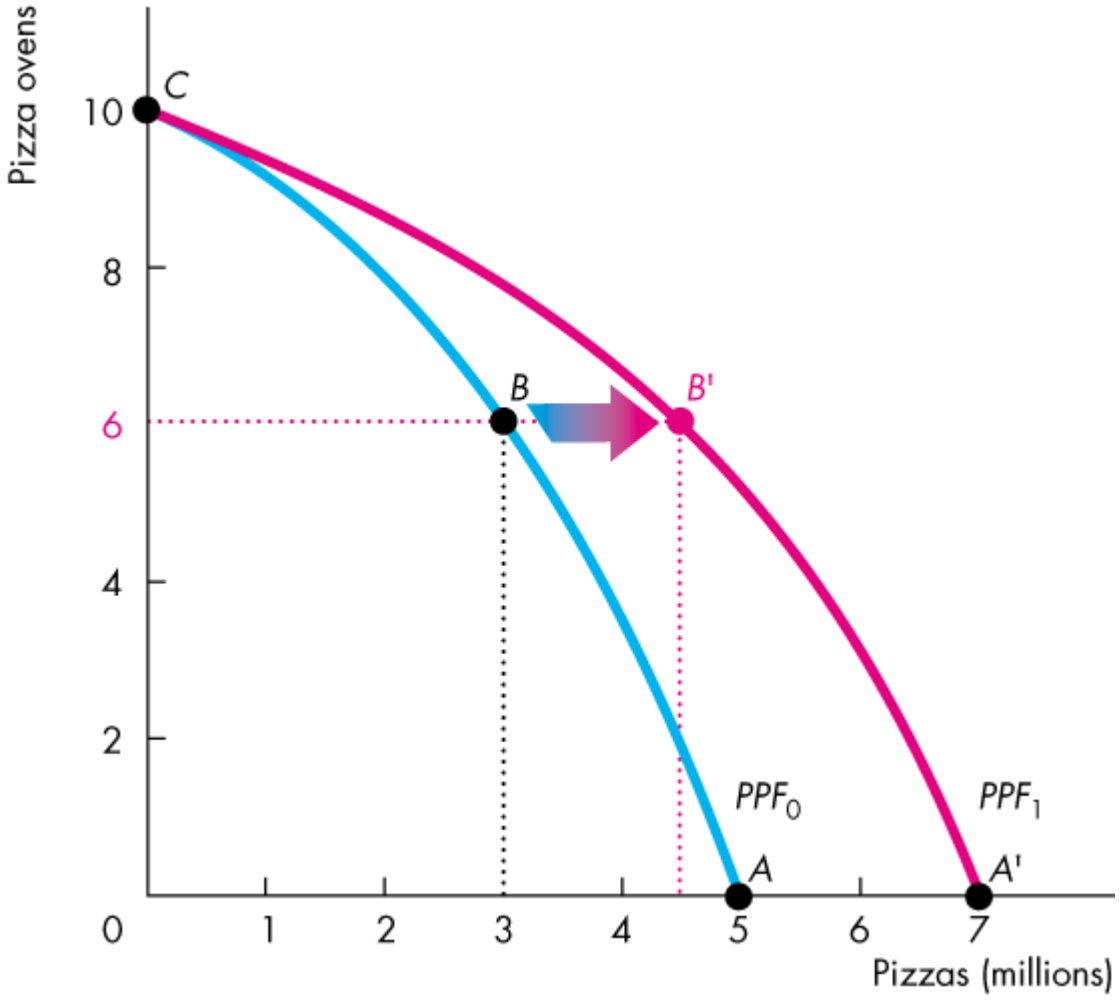
Figure 2.8 illustrates the tradeoff we face.

We can produce pizzas or pizza ovens along PPF_0.

By using some resources to produce pizza ovens today, the *PPF* shifts outward in the future.



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Economic Growth

Changes in What We Produce

Investment in capital and technology creates economic growth and increases income.

The model of specialization and trade explains the different patterns of production across countries.

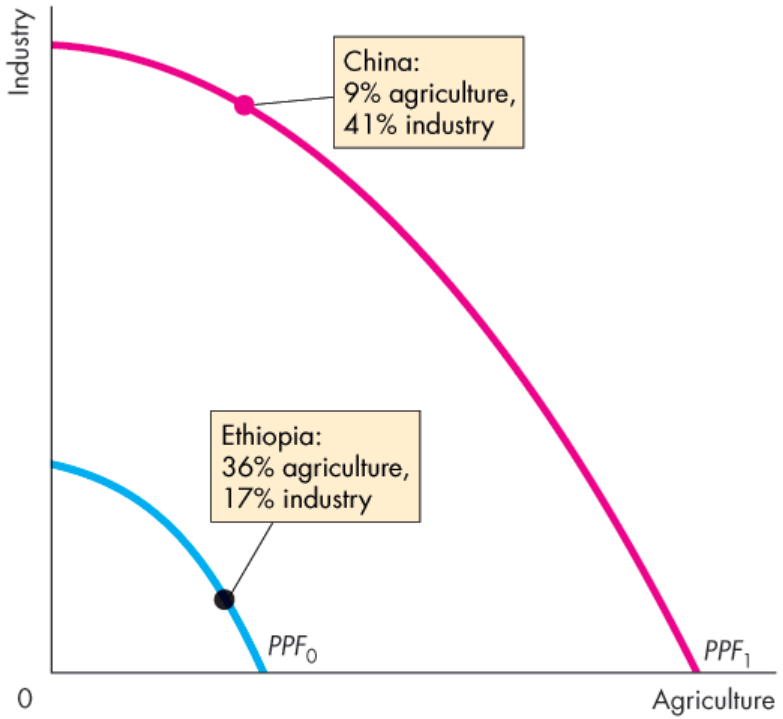
Figure 2.9 illustrates how economic growth influences the pattern of production.

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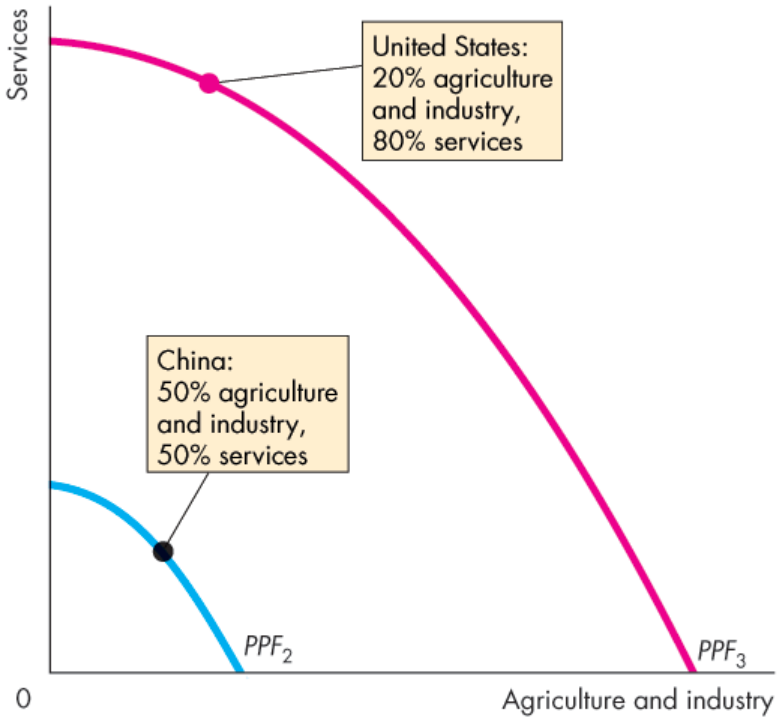
Economic Growth

Figure 2.9(a) compares low-income Ethiopia and China.

Figure 2.9(b) compares China and the rich United States.

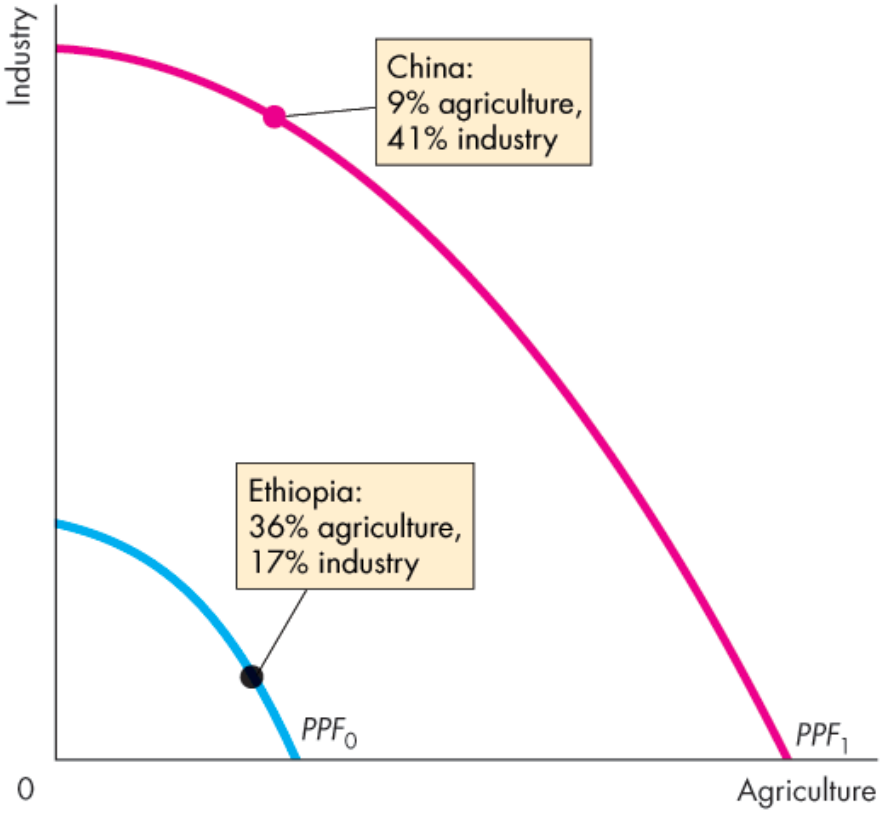


(a) From Low to Middle Income

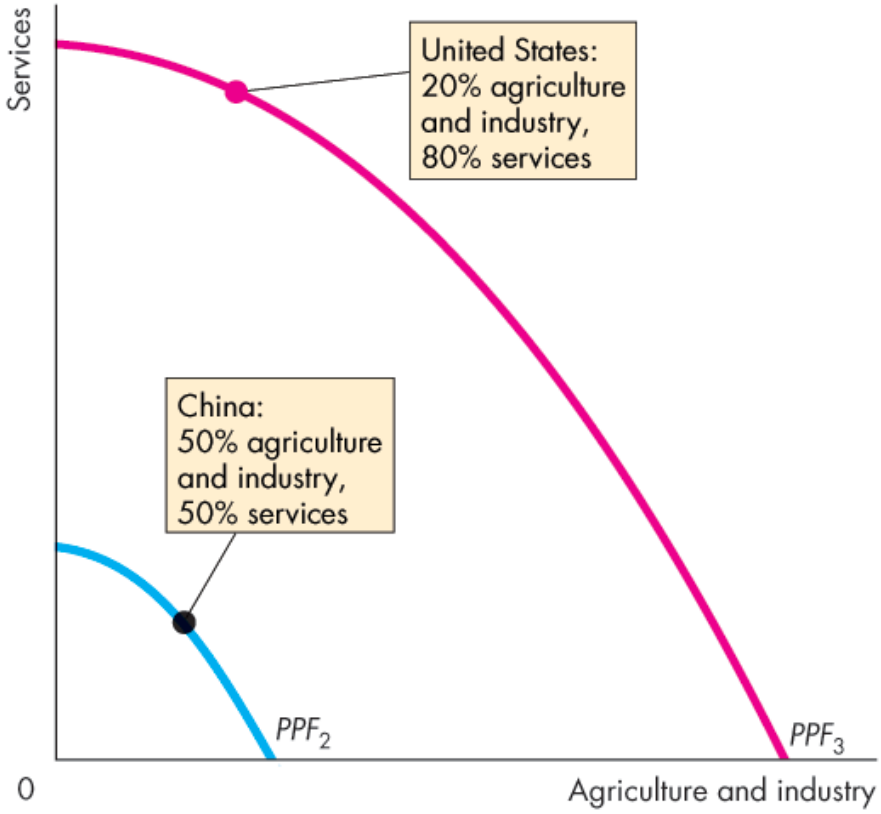


(b) From Middle to High Income

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(a) From Low to Middle Income



(b) From Middle to High Income

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Economic Coordination

To reap the gains from trade, the choices of individuals must be coordinated.

To make coordination work, four complimentary social institutions have evolved over the centuries:

- Firms
- Markets
- Property rights
- Money

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Economic Coordination

A **firm** is an economic unit that hires factors of production and organizes those factors to produce and sell goods and services.

A **market** is any arrangement that enables buyers and sellers to get information and do business with each other.

Property rights are the social arrangements that govern ownership, use, and disposal of resources, goods, or services.

Money is any commodity or token that is generally acceptable as a means of payment.

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Economic Coordination

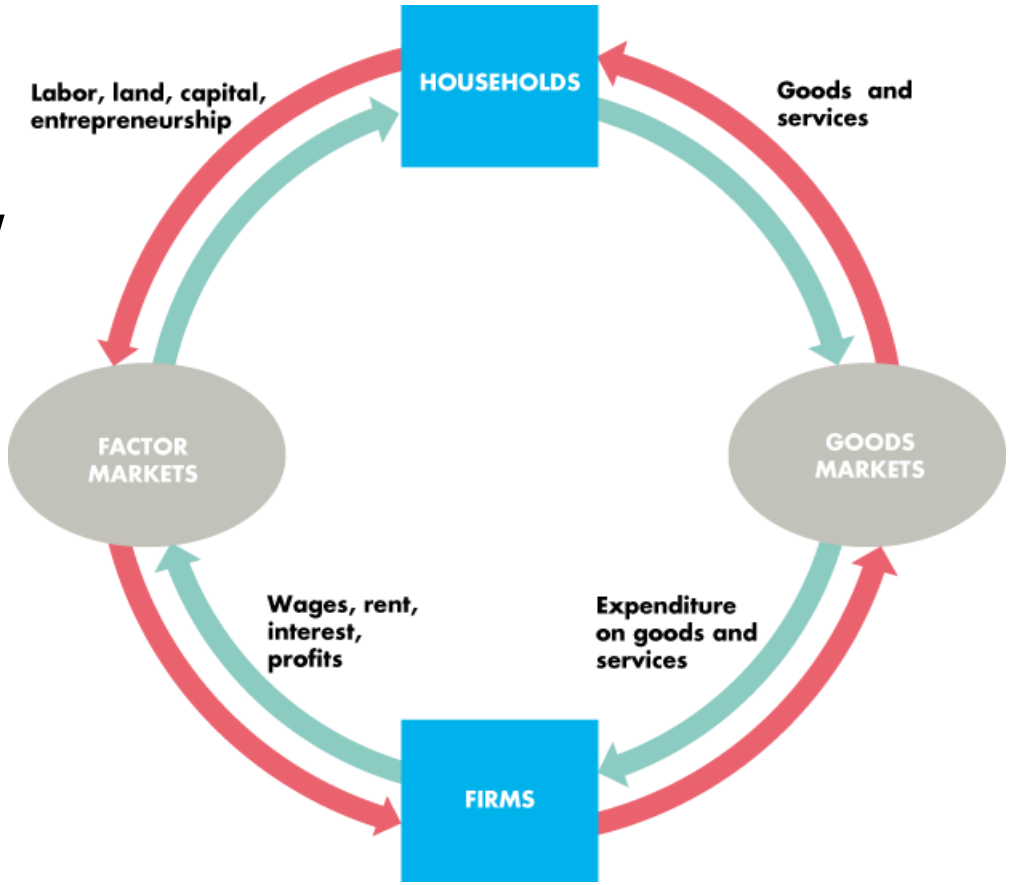
Circular Flows Through Markets

Figure 2.8 illustrates how households and firms interact in the market economy.

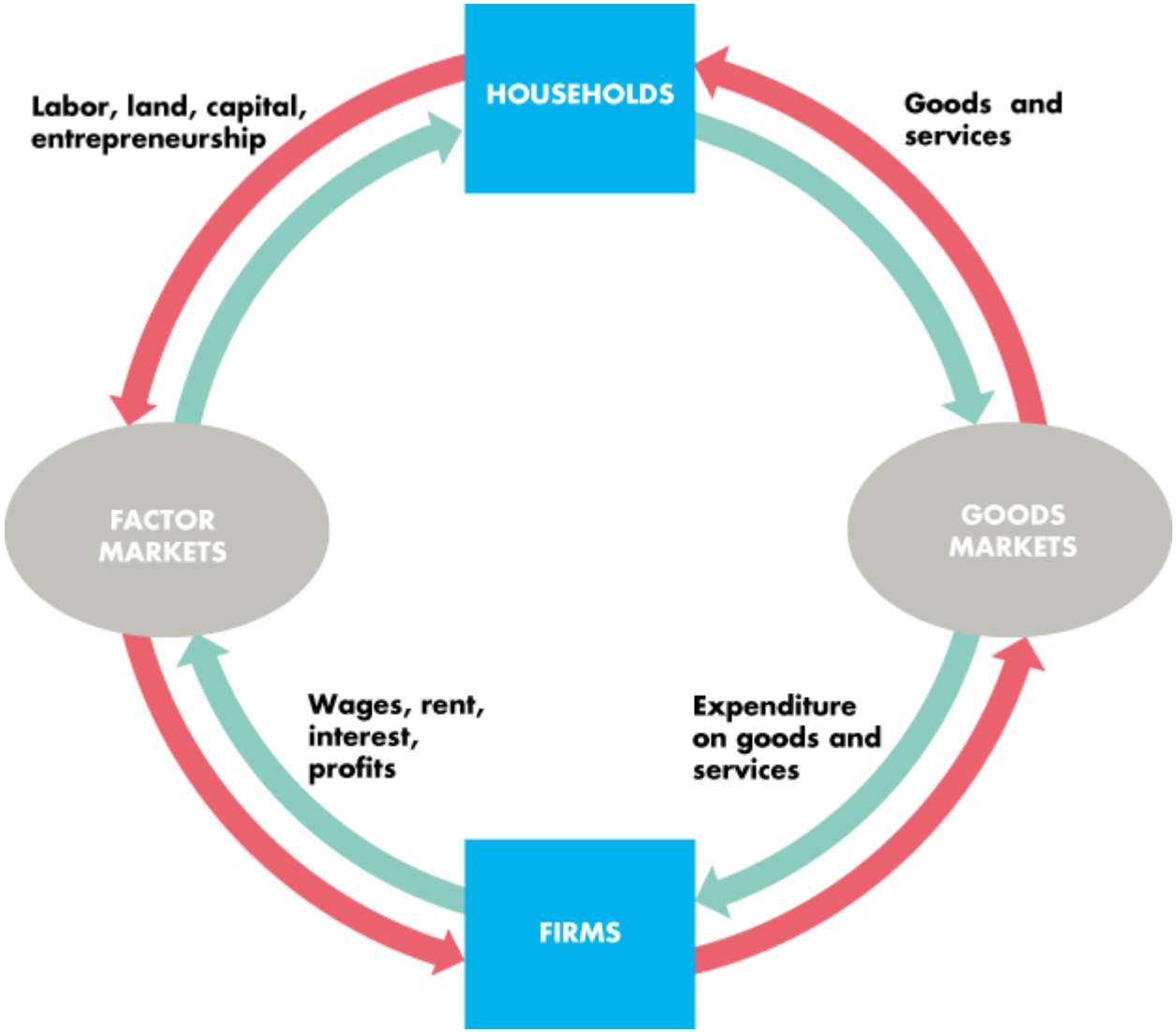
Factors of production, and …

goods and services flow in one direction.

Money flows in the opposite direction.



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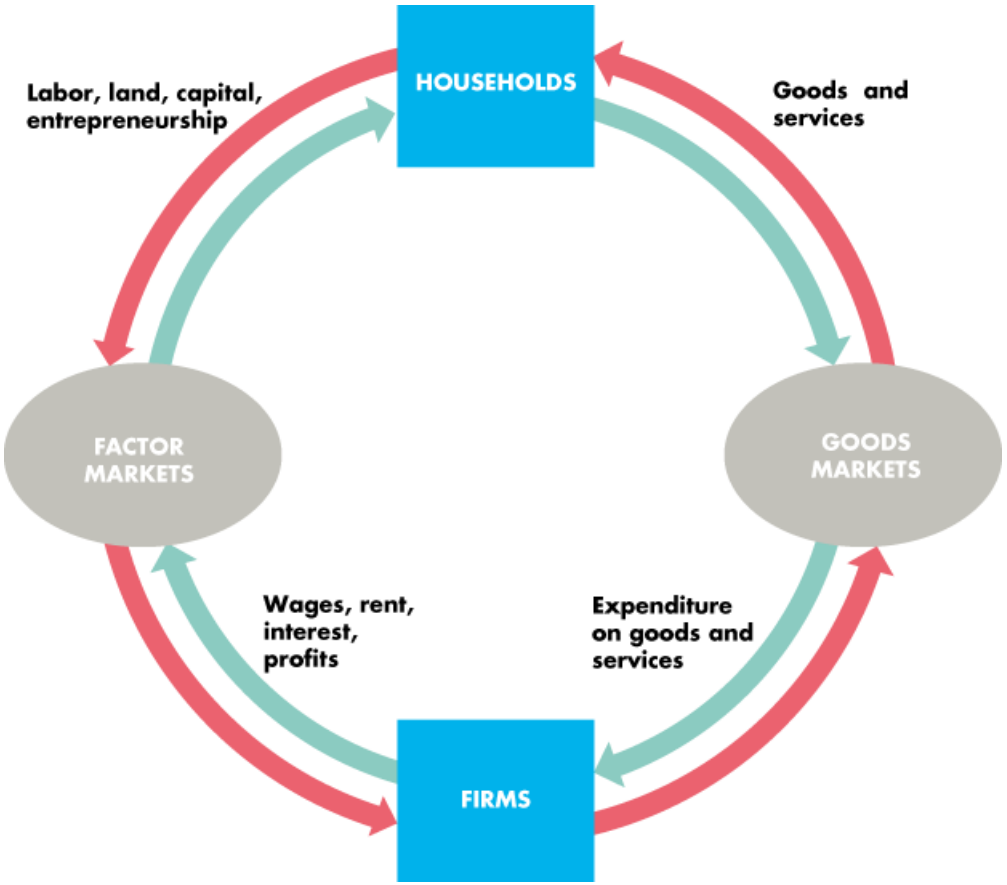


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Economic Coordination

Coordinating Decisions

Markets coordinate individual decisions through price adjustments.



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