

GLOBAL
EDITION



Essential Foundations of Economics

SEVENTH EDITION

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ALWAYS LEARNING

PEARSON



Is wind power free?



3

The Economic Problem

CHAPTER CHECKLIST

When you have completed your study of this chapter, you will be able to

- 1** Explain and illustrate the concepts of scarcity, production efficiency, and tradeoff using the production possibilities frontier.
- 2** Calculate opportunity cost.
- 3** Explain what makes production possibilities expand.
- 4** Explain how people gain from specialization and trade.

3.1 PRODUCTION POSSIBILITIES

■ Production Possibilities Frontier

Production possibilities frontier

The boundary between the combinations of goods and services that can be produced and the combinations that cannot be produced, given the available factors of production and the state of technology.

The *PPF* is a valuable tool for illustrating the effects of scarcity and its consequences.

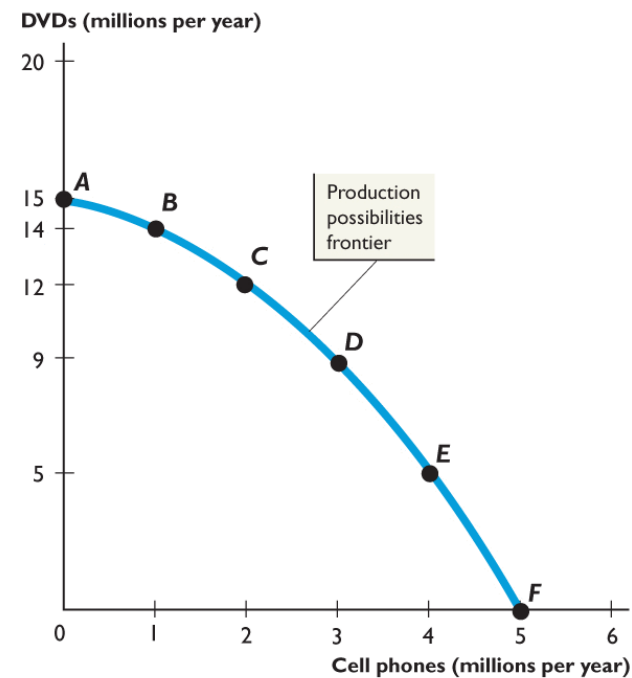
3.1 PRODUCTION POSSIBILITIES



Figure 3.1 shows the *PPF* for cell phones and DVDs.

Each point on the graph represents a column of the table.

The line through the points is the *PPF*.



Cell phones (millions)	0	1	2	3	4	5
DVDs (millions)	15	14	12	9	5	0
Possibility	A	B	C	D	E	F

3.1 PRODUCTION POSSIBILITIES

The *PPF* puts three features of production possibilities in sharp focus:

- Attainable and unattainable combinations
- Efficient and inefficient production
- Tradeoffs and free lunches

3.1 PRODUCTION POSSIBILITIES

Attainable and Unattainable Combinations

Because the *PPF* shows the limits to production, it separates attainable combinations from unattainable ones.

Figure 3.2 on the next slide illustrates the attainable and unattainable combinations.

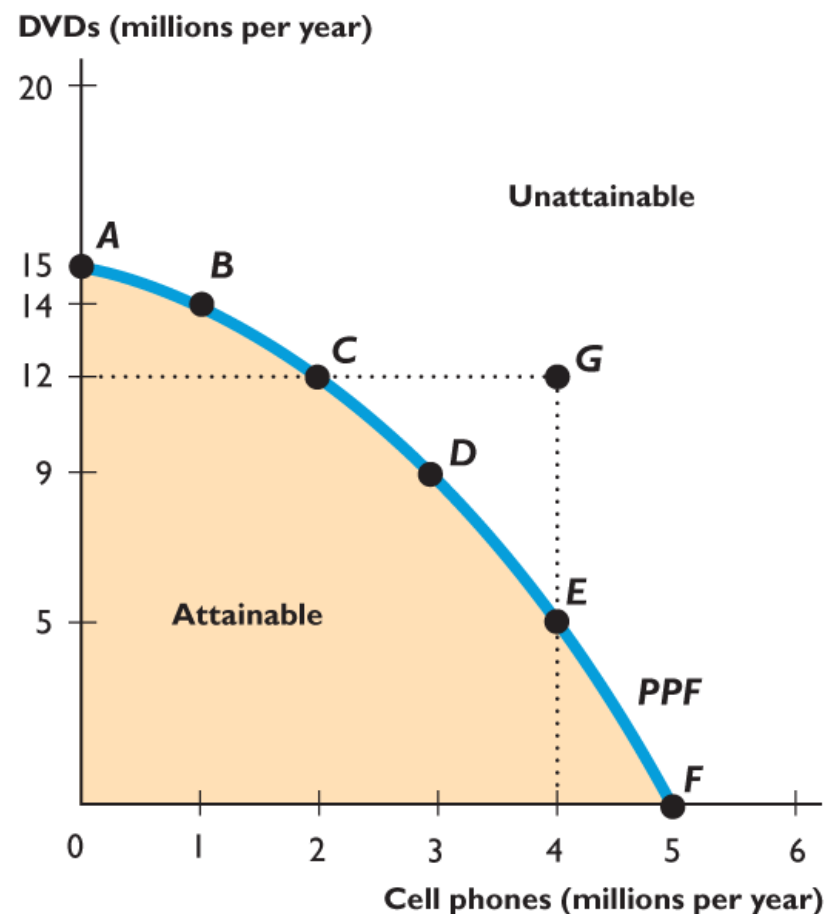
3.1 PRODUCTION POSSIBILITIES



We can produce at any point inside the *PPF* or on the frontier.

We cannot produce at any point outside the *PPF* such as point *G*.

The *PPF* separates attainable combinations from unattainable combinations.



3.1 PRODUCTION POSSIBILITIES

Efficient and Inefficient Production

Production efficiency is a situation in which we cannot produce more of one good or service without producing less of something else.

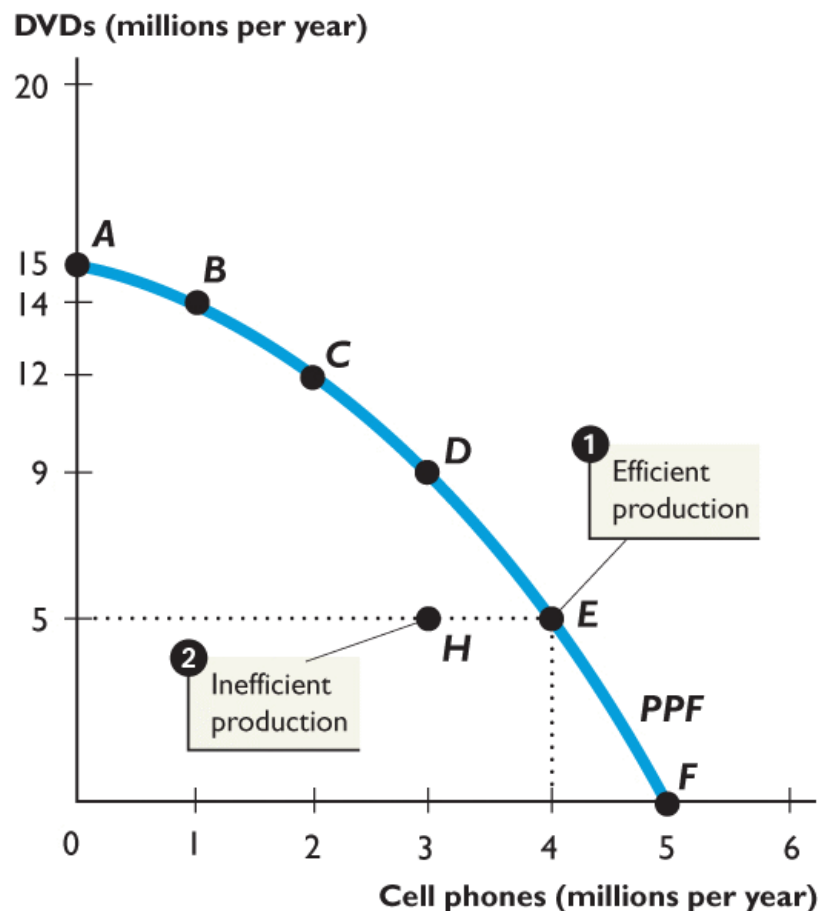
Figure 3.3 on the next slide illustrates the distinction between efficient and inefficient production.

3.1 PRODUCTION POSSIBILITIES



1. When production is *on* the *PPF*, such as at point *E* or *D*, production is efficient.
2. If production were *inside* the *PPF*, such as at point *H*, more could be produced of both goods without forgoing either good.

Production is inefficient.



3.1 PRODUCTION POSSIBILITIES

Tradeoffs and Free Lunches

A **tradeoff** is an exchange—giving up one thing to get something else.

A free lunch is a gift—getting something without giving up something else.

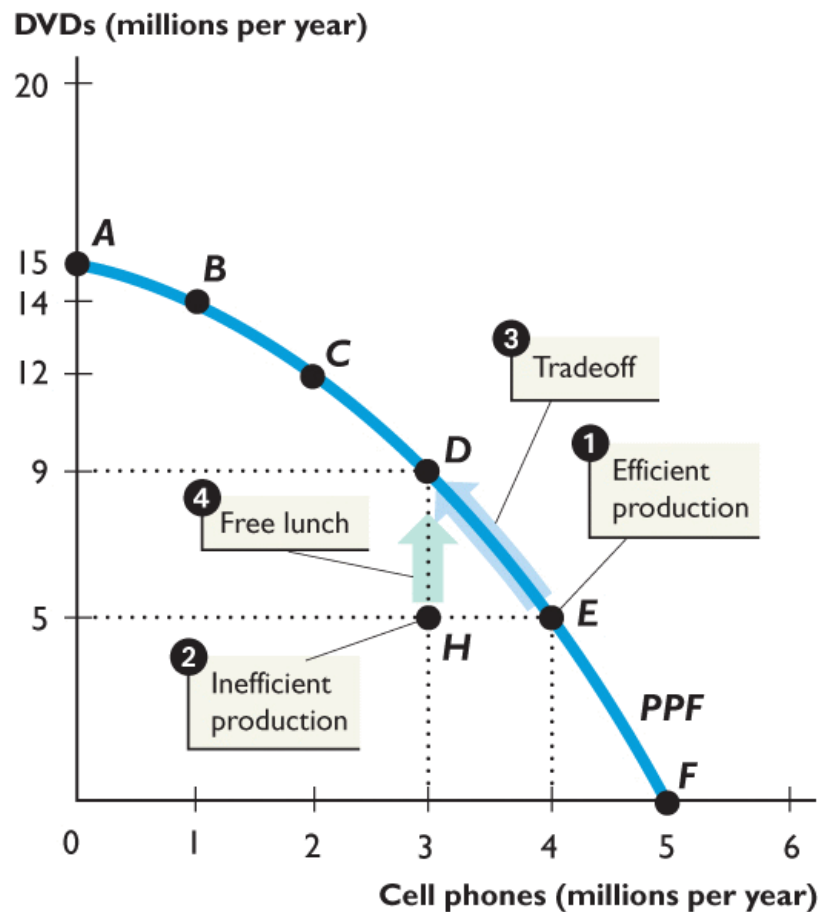
Figure 3.3 on the next slide illustrates the distinction between a tradeoff and a free lunch.

3.1 PRODUCTION POSSIBILITIES

3. When production is *on* the *PPF*, we face a tradeoff.

4. If production were *inside* the *PPF*, there *would be* a free lunch.

Moving from point *H* to point *D* does not involve a tradeoff.



3.2 OPPORTUNITY COST

■ The Opportunity Cost of a Cell Phone

The opportunity cost of a cell phone is the decrease in the quantity of DVDs divided by the increase in the number of cell phones as we move along the *PPF*.

Figure 3.4 illustrates the calculation of the opportunity cost of a cell phone.

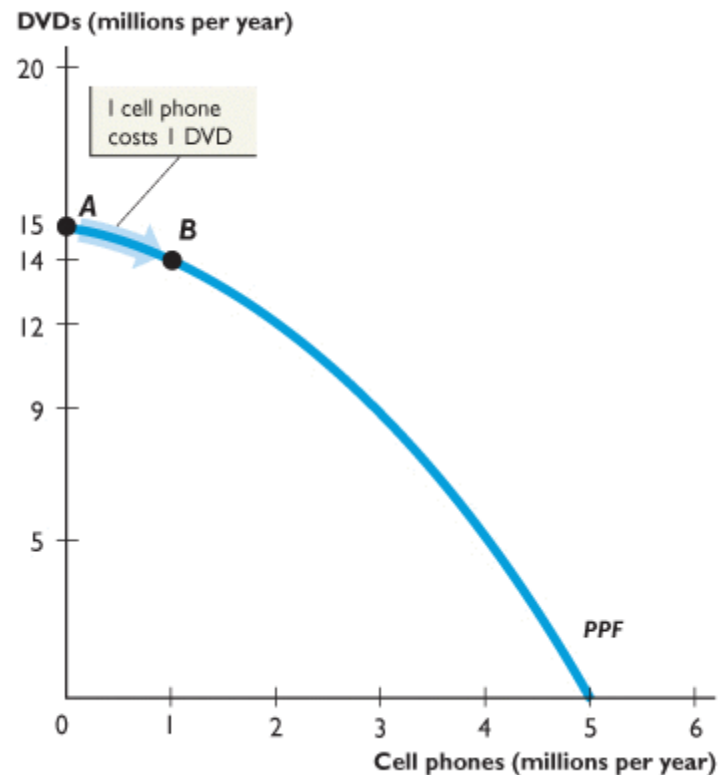
3.2 OPPORTUNITY COST



Moving from *A* to *B*, 1 cell phone costs 1 DVD.

Movement along PPF	Decrease in quantity of DVDs	Increase in quantity of cell phones	Decrease in DVDs divided by increase in cell phones
<i>A</i> to <i>B</i>	1 million	1 million	1 DVD per phone

Along the PPF from *A* to *F*, the opportunity cost of a cell phone increases as the quantity of cell phones produced increases.

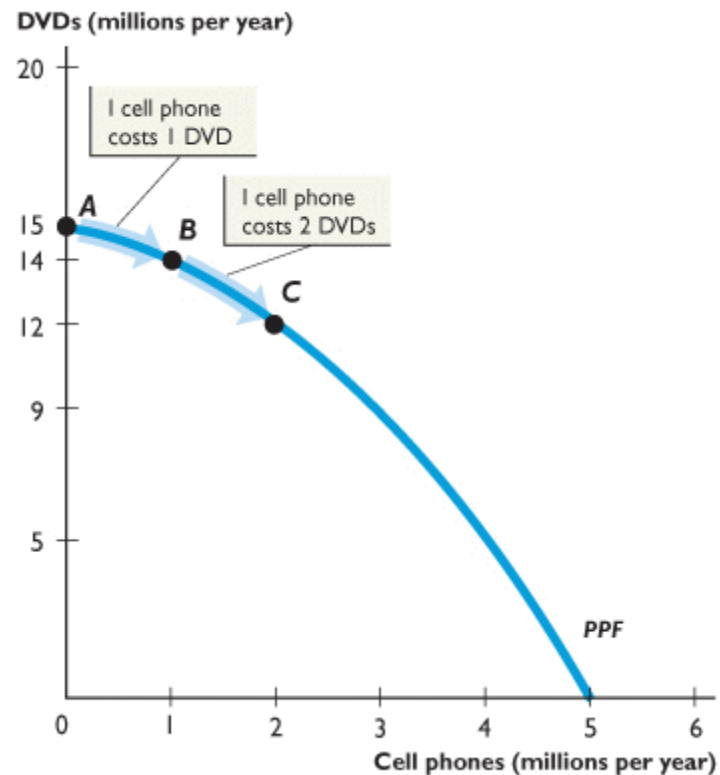


3.2 OPPORTUNITY COST

Moving from *B* to *C*, 1 cell phone costs 2 DVDs.

Movement along PPF	Decrease in quantity of DVDs	Increase in quantity of cell phones	Decrease in DVDs divided by increase in cell phones
<i>A</i> to <i>B</i>	1 million	1 million	1 DVD per phone
<i>B</i> to <i>C</i>	2 million	1 million	2 DVDs per phone

Along the PPF from *A* to *F*, the opportunity cost of a cell phone increases as the quantity of cell phones produced increases.

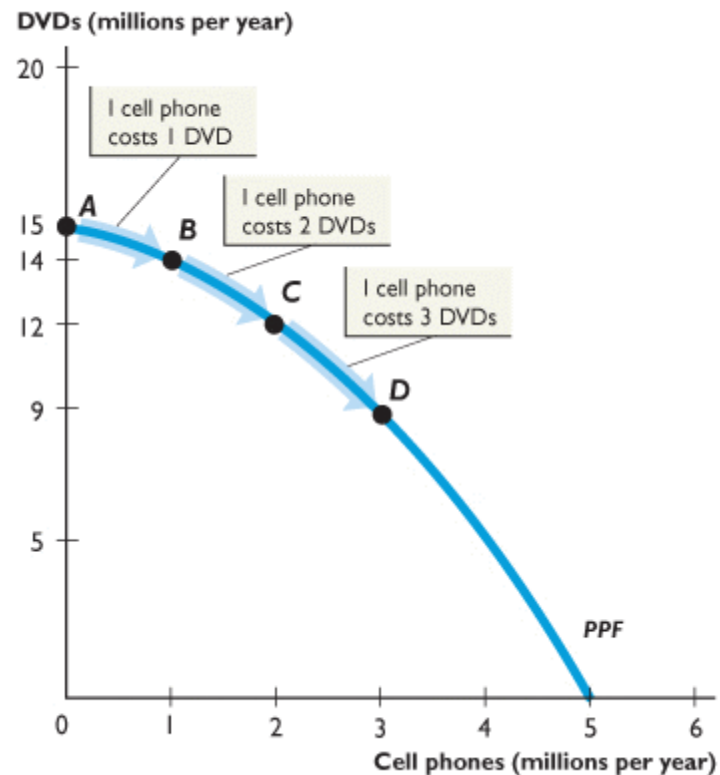


3.2 OPPORTUNITY COST

Moving from *C* to *D*, 1 cell phone costs 3 DVDs.

Movement along PPF	Decrease in quantity of DVDs	Increase in quantity of cell phones	Decrease in DVDs divided by increase in cell phones
<i>A</i> to <i>B</i>	1 million	1 million	1 DVD per phone
<i>B</i> to <i>C</i>	2 million	1 million	2 DVDs per phone
<i>C</i> to <i>D</i>	3 million	1 million	3 DVDs per phone

Along the PPF from *A* to *F*, the opportunity cost of a cell phone increases as the quantity of cell phones produced increases.

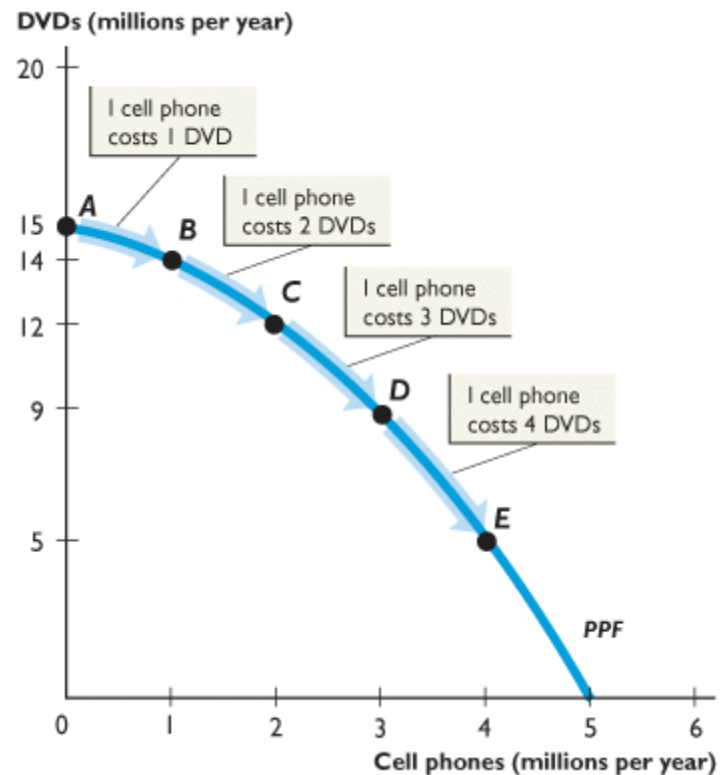


3.2 OPPORTUNITY COST

Moving from *D* to *E*, 1 cell phone costs 4 DVDs.

Movement along PPF	Decrease in quantity of DVDs	Increase in quantity of cell phones	Decrease in DVDs divided by increase in cell phones
<i>A</i> to <i>B</i>	1 million	1 million	1 DVD per phone
<i>B</i> to <i>C</i>	2 million	1 million	2 DVDs per phone
<i>C</i> to <i>D</i>	3 million	1 million	3 DVDs per phone
<i>D</i> to <i>E</i>	4 million	1 million	4 DVDs per phone

Along the PPF from *A* to *F*, the opportunity cost of a cell phone increases as the quantity of cell phones produced increases.

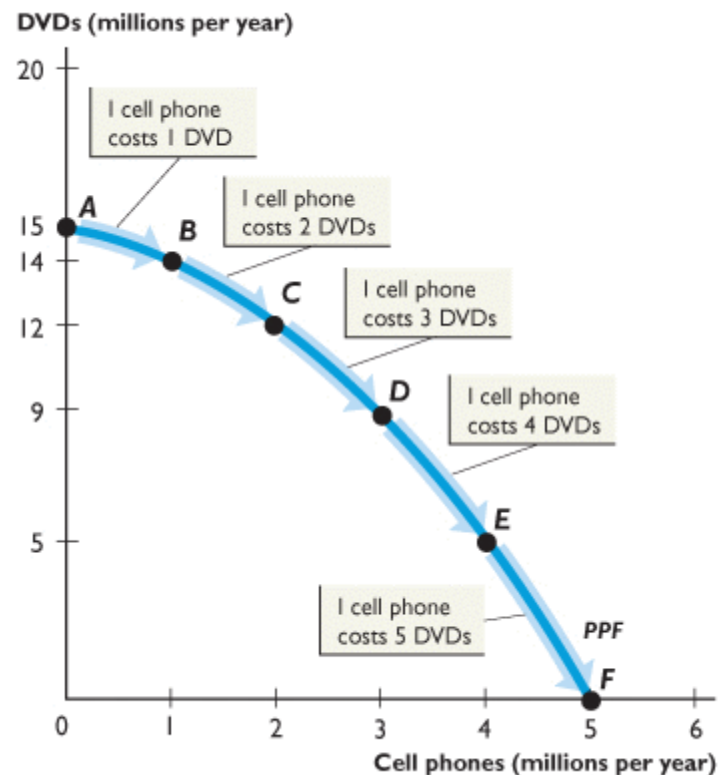


3.2 OPPORTUNITY COST

Moving from *E* to *F*, 1 cell phone costs 5 DVDs.

Movement along PPF	Decrease in quantity of DVDs	Increase in quantity of cell phones	Decrease in DVDs divided by increase in cell phones
<i>A</i> to <i>B</i>	1 million	1 million	1 DVD per phone
<i>B</i> to <i>C</i>	2 million	1 million	2 DVDs per phone
<i>C</i> to <i>D</i>	3 million	1 million	3 DVDs per phone
<i>D</i> to <i>E</i>	4 million	1 million	4 DVDs per phone
<i>E</i> to <i>F</i>	5 million	1 million	5 DVDs per phone

Along the PPF from *A* to *F*, the opportunity cost of a cell phone increases as the quantity of cell phones produced increases.

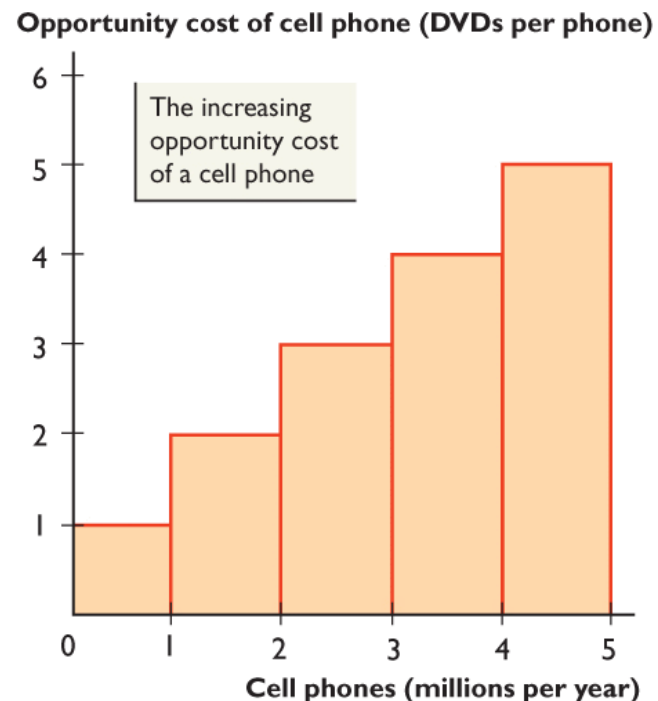


3.2 OPPORTUNITY COST



Increasing Opportunity Cost

The opportunity cost of a cell phone increases as more cell phones are produced.



Cell phones (millions)	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5
Opportunity cost (DVDs per phone)	1	2	3	4	5

3.2 OPPORTUNITY COST

■ Opportunity Cost and the Slope of the *PPF*

The magnitude of the slope of the *PPF* measures opportunity cost.

The slope of the *PPF* in Figure 3.4 measures the opportunity cost of a cell phone.

The *PPF* is bowed outward. As more cell phones are produced, the *PPF* becomes steeper and the opportunity cost of a cell phone increases.

3.2 OPPORTUNITY COST

■ Opportunity Cost Is a Ratio

The opportunity cost of a cell phone is the quantity of DVDs forgone divided by the increase in the quantity of cell phones gained.

The opportunity cost of a DVD is the quantity of cell phones forgone divided by the increase in the quantity of DVDs gained.

When the opportunity cost of a cell phone is x DVDs, the opportunity cost of a DVD is $1/x$ cell phones.

3.2 OPPORTUNITY COST

■ Increasing Opportunity Costs Are Everywhere

Just about every activity has an increasing opportunity cost.

3.3 ECONOMIC GROWTH

Economic growth is the sustained expansion of production possibilities.

An economy grows when it develops better technology, improves the quality of labor, or increases the quantity of capital.

When an economy's resources increase, its production possibilities expand and its *PPF* shifts outward.

To study economic growth, we begin at the *PPF* with consumption goods on one axis and a capital good on the other.

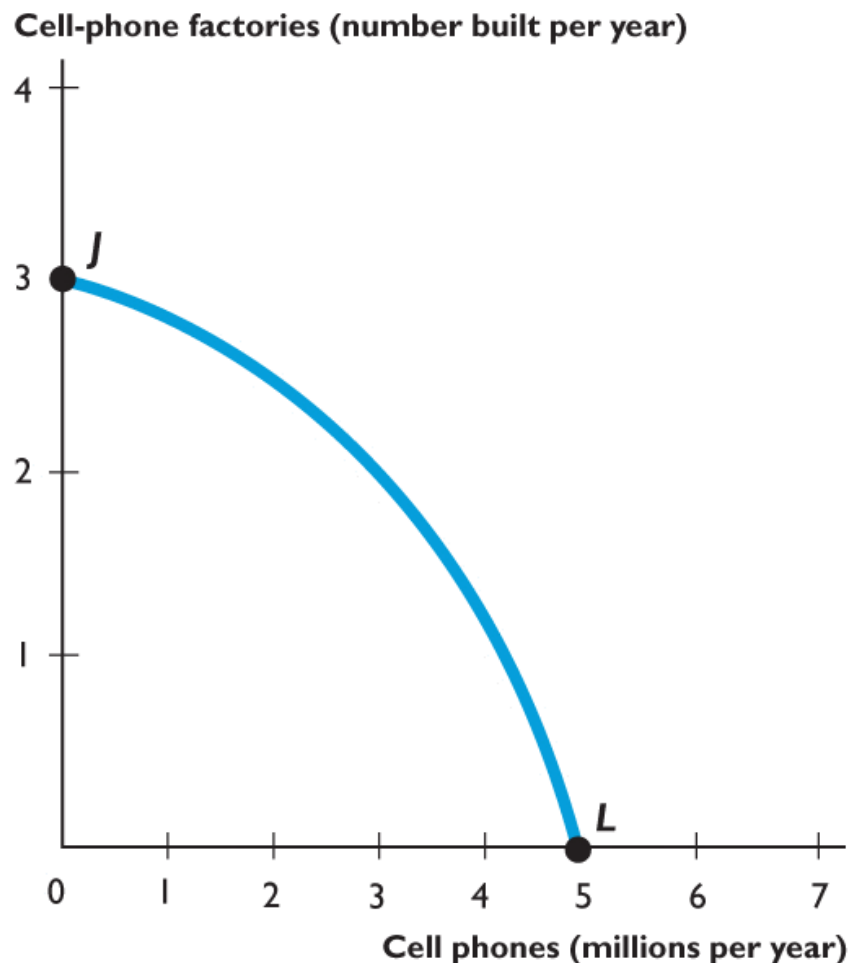
3.3 ECONOMIC GROWTH



If we produce at point J , we produce only cell-phone factories and no cell phones.

If we produce at point L , we produce cell phones and no cell-phone factories.

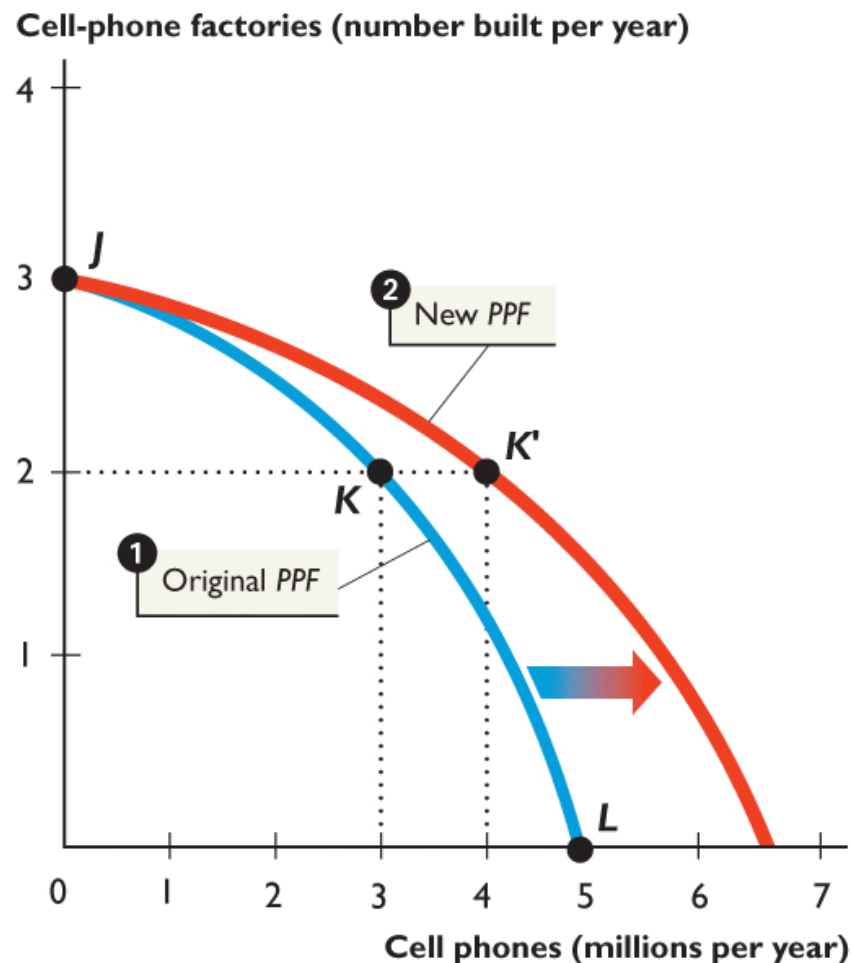
At L , consumption remains at 5 million cell phones every year.



3.3 ECONOMIC GROWTH

1. But if we cut production of cell phones to 3 million this year, we can produce 2 cell-phone factories at point K .
2. Then next year, our PPF shifts outward because we have more capital.

We can consume at a point outside our original PPF , such as K' .



3.4 SPECIALIZATION AND TRADE

When one person (or nation) is more productive than another—needs fewer inputs or takes less time to produce a good or perform a production task—we say that this person (or nation) has an **absolute advantage**.

People and nations can gain from specializing in production of the goods in which they have a comparative advantage and then trading.

3.4 SPECIALIZATION AND TRADE

■ Comparative Advantage

Comparative advantage is the ability of a person to perform an activity or produce a good or service at a lower opportunity cost than someone else.

Joe and Liz operate smoothie bars and produce smoothies and salads.

3.4 SPECIALIZATION AND TRADE

Liz's Smoothie Bar

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

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

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

Each hour, Liz splits her time equally between smoothies and salads and produces 15 smoothies and 15 salads.

TABLE 3.1 LIZ'S PRODUCTION POSSIBILITIES

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

3.4 SPECIALIZATION AND TRADE

Joe's Smoothie Bar

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

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

Joe's opportunity cost of producing 1 salad is $\frac{1}{5}$ smoothie.

Each hour, Joe spends 50 minutes producing smoothies and makes 5 smoothies. In the other 10 minutes, he produces 5 salads.

TABLE 3.2 JOE'S PRODUCTION POSSIBILITIES

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

3.4 SPECIALIZATION AND 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.

3.4 SPECIALIZATION AND TRADE

Joe's Comparative Advantage

Joe's opportunity cost of a salad is $\frac{1}{5}$ smoothie.

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

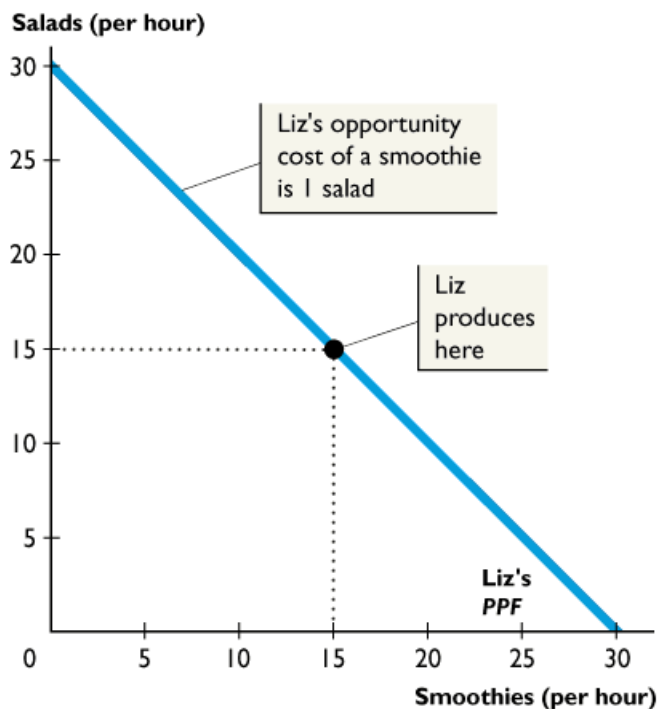
Joe's opportunity cost of a salad is *less* than Liz's, ...

so Joe has a comparative advantage in producing salads.

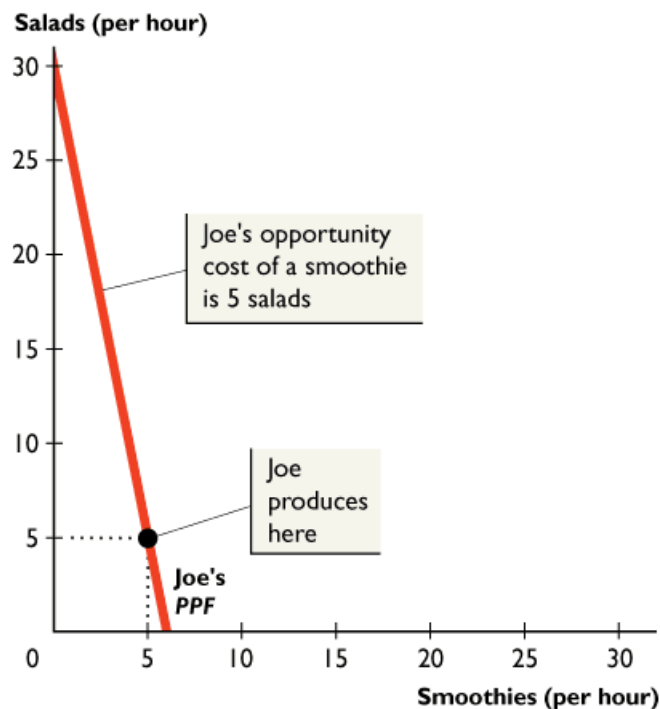
3.4 SPECIALIZATION AND TRADE



Liz and Joe produce at a point on their *PPFs*.
Liz has a comparative advantage in producing smoothies.
Joe has a comparative advantage in producing salads.



(a) Liz's PPF and production



(b) Joe's PPF and production

3.4 SPECIALIZATION AND TRADE



■ Achieving Gains from Trade

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

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

TABLE 3.3 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

3.4 SPECIALIZATION AND TRADE

Liz and Joe trade:

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

After trade:

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

TABLE 3.3 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		
Smoothies	sell 10	buy 10
Salads	buy 20	sell 20
(d) After Trade		
Smoothies	20	10
Salads	20	10

3.4 SPECIALIZATION AND TRADE

Gains from trade:

- Liz gains 5 smoothies and 5 salads an hour—she originally produced 15 smoothies and 15 salads.
- Joe gains 5 smoothies and 5 salads an hour—he originally produced 5 smoothies and 5 salads.

Figure 3.8 on the next slide illustrates the gains from trade.

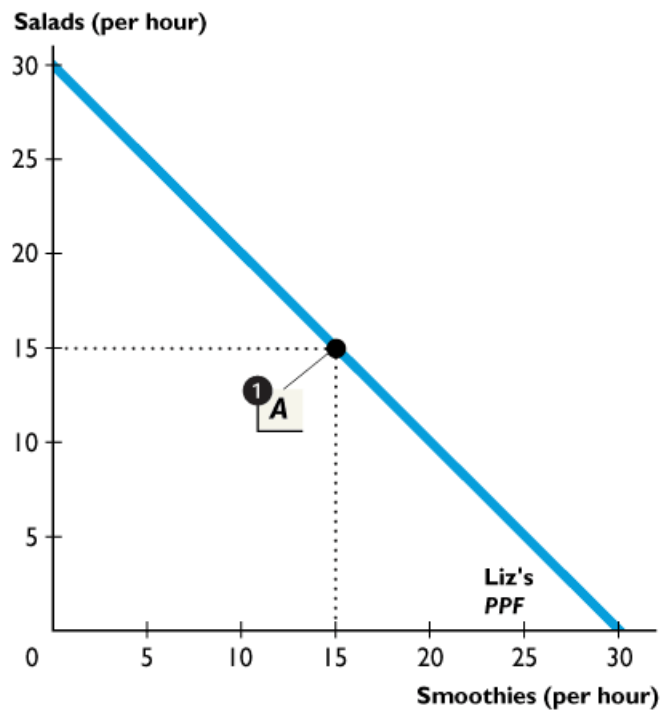
TABLE 3.3 LIZ AND JOE GAIN FROM TRADE

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

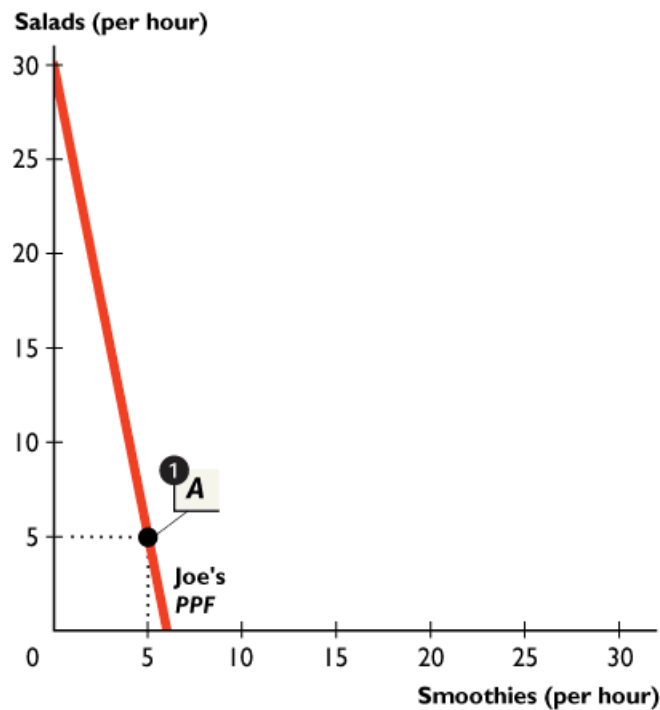
3.4 SPECIALIZATION AND TRADE



1. Liz and Joe each produce at point *A* on their *PPFs*.



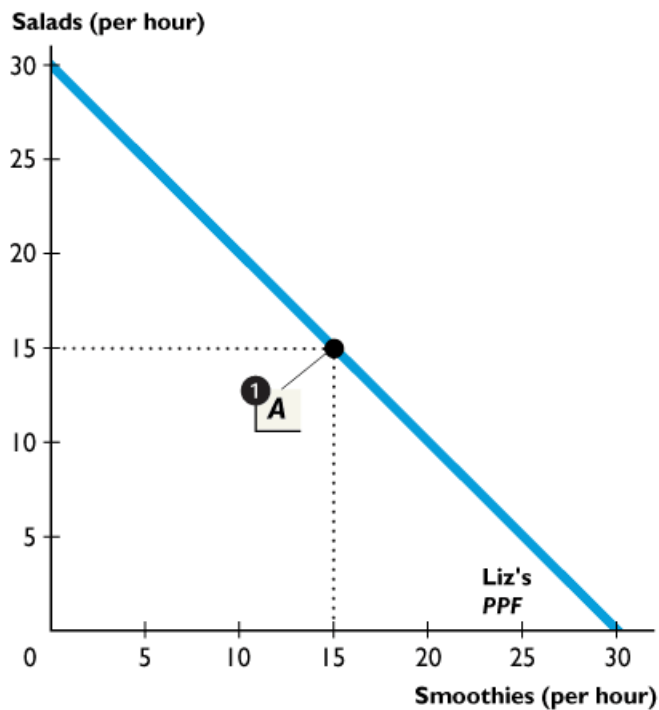
(a) Liz's gains from trade



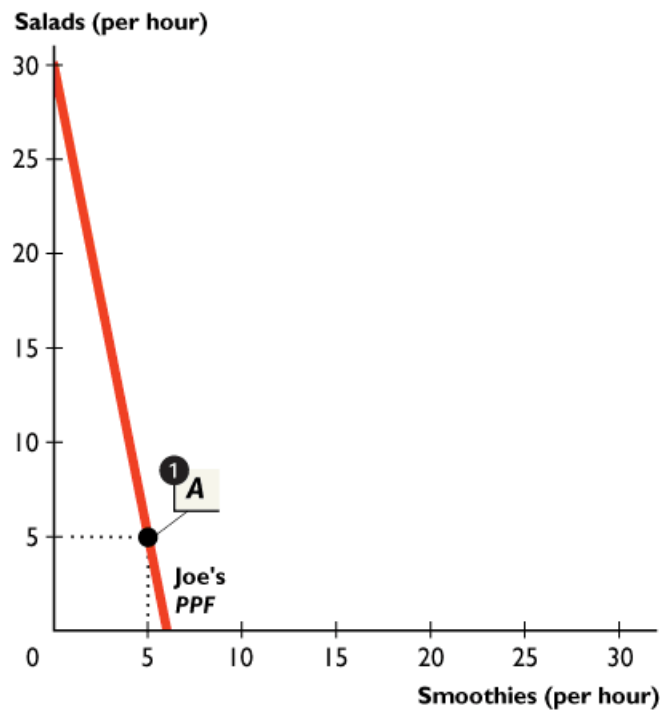
(b) Joe's gains from trade

3.4 SPECIALIZATION AND TRADE

Liz has a comparative advantage in producing smoothies.
Joe has a comparative advantage in producing salads.



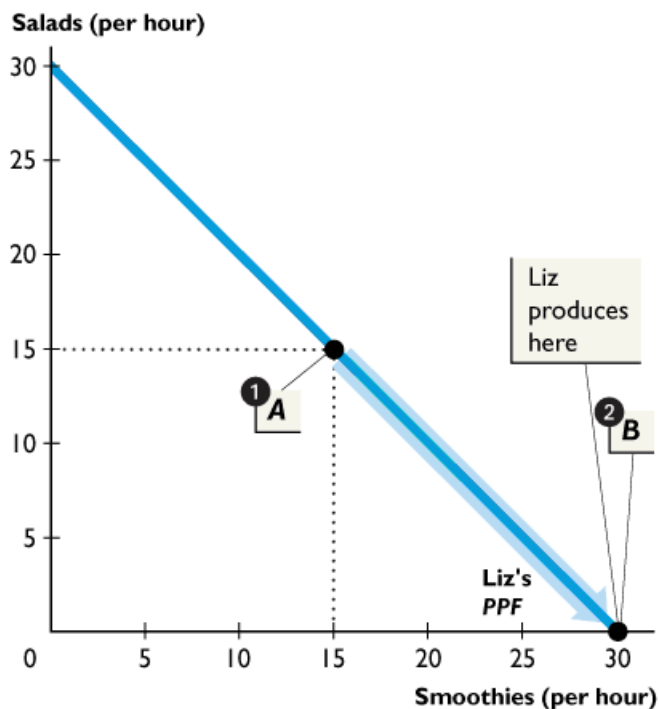
(a) Liz's gains from trade



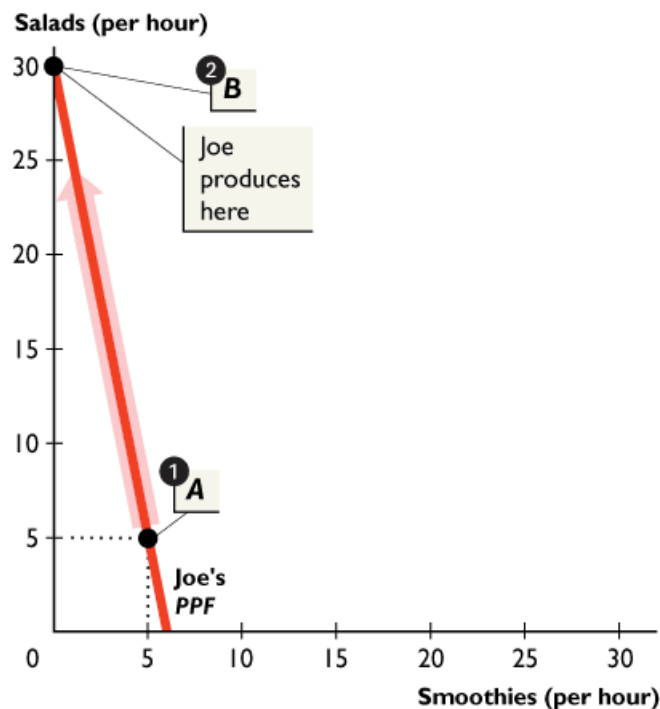
(b) Joe's gains from trade

3.4 SPECIALIZATION AND TRADE

2. Liz and Joe specialize in producing the good in which they have a comparative advantage.



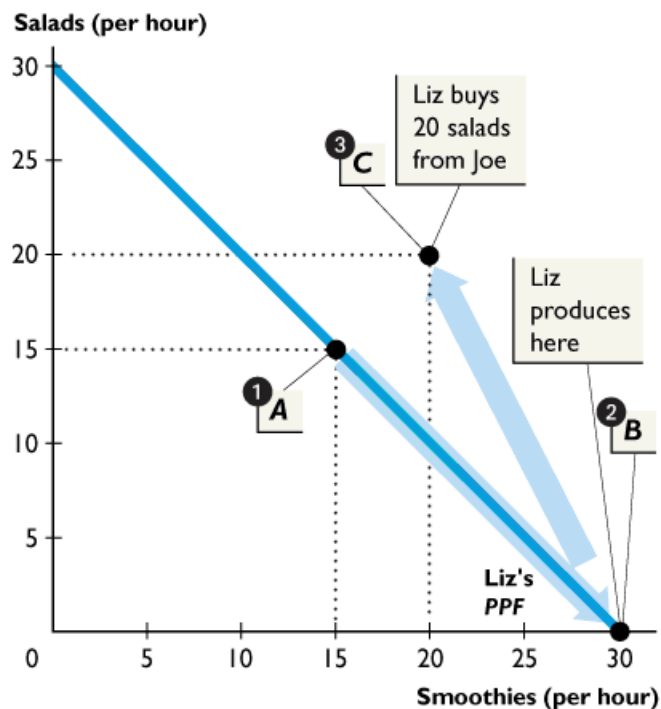
(a) Liz's gains from trade



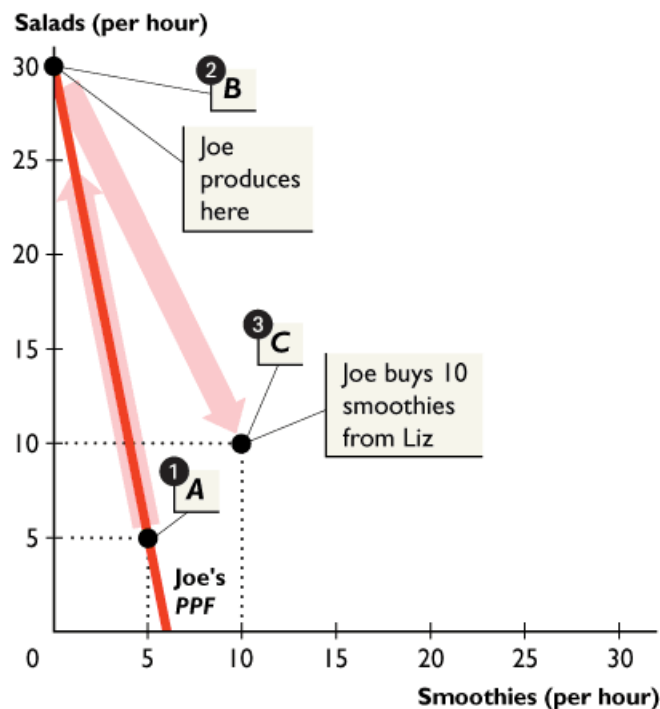
(b) Joe's gains from trade

3.4 SPECIALIZATION AND TRADE

Liz and Joe trade salads and smoothies at a price of 2 salads per smoothie.



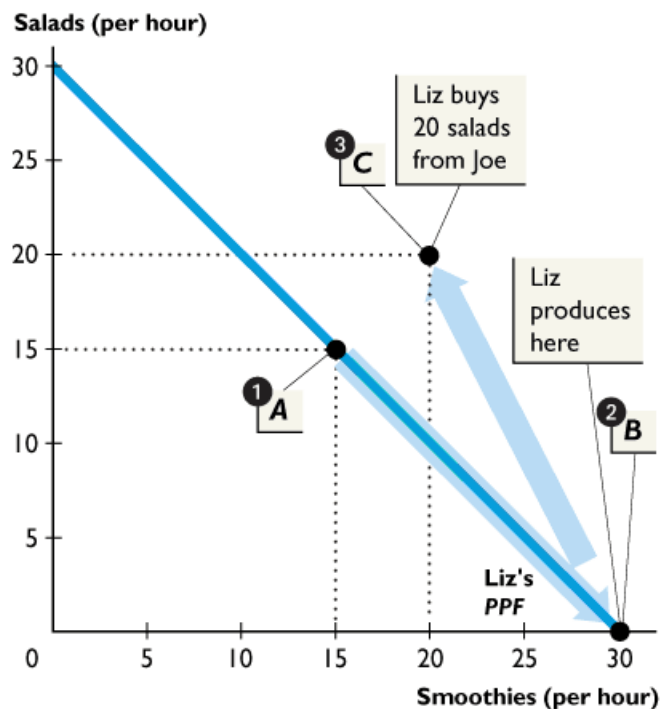
(a) Liz's gains from trade



(b) Joe's gains from trade

3.4 SPECIALIZATION AND TRADE

3. Liz and Joe consume at point C, which is outside their *PPFs*. Both gain from specialization and trade.



(a) Liz's gains from trade



(b) Joe's gains from trade



EYE on the ENVIRONMENT

Is Wind Power Free?

Wind power is not free.

Its opportunity cost includes the huge amounts of other goods and services we give up to build wind turbines and transmission lines.

Wind turbines can produce electricity only when there is wind, which is, at best, 40 percent of the time and, on average, about 25 percent of the time.

Also some of the best wind farm locations are a long way from major population centers, so transmission lines would be long and power transmission losses large.



EYE on the ENVIRONMENT

Is Wind Power Free?

Point A is a point of efficient electricity production.

If the United States produces 55 percent of the electricity using South Dakota wind power, ...

the United States would be operating inside its *PPF* such as a point like Z.

