





After studying this chapter, you will be able to:

- ◆ Define the production possibilities frontier and use it to calculate opportunity cost
- ◆ Distinguish between production possibilities and preferences and describe an efficient allocation of resources
- ◆ Explain how current production choices expand future production possibilities
- ◆ Explain how specialization and trade expand production possibilities
- ◆ Describe the economic institutions that coordinate decision

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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.

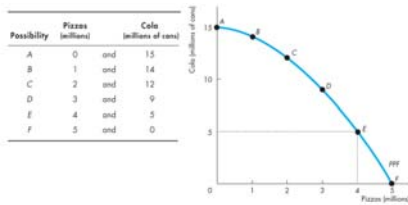
That is, we look at a model economy in which everything remains the same (*ceteris paribus*) except the two goods we're considering.

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Production Possibilities and Opportunity Cost

Production Possibilities Frontier

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

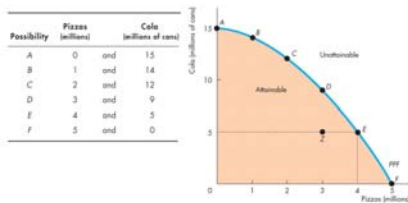


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Production Possibilities and Opportunity Cost

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.



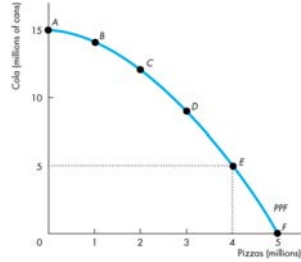
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Production Possibilities and Opportunity Cost

Production Efficiency

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

Points on the frontier are *efficient*.



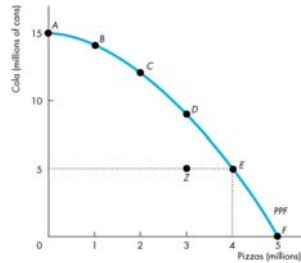
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Production Possibilities and Opportunity Cost

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.



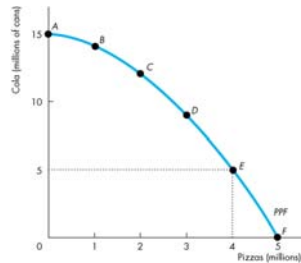
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Production Possibilities and Opportunity Cost

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 give up some pizzas to get more cola.

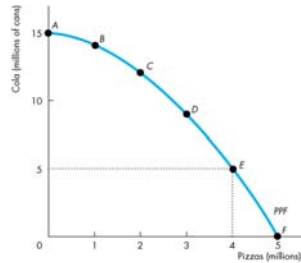


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Production Possibilities and Opportunity Cost

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

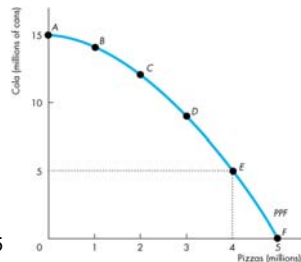
In moving from E to F:

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

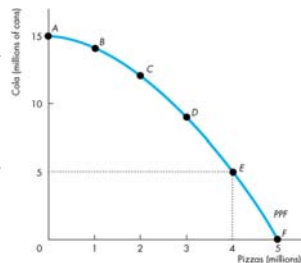
In moving from F to E:

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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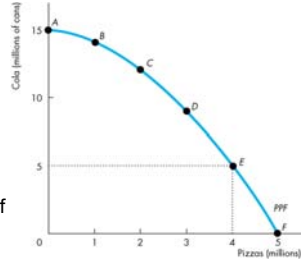
Production Possibilities and Opportunity Cost

Opportunity Cost Is a Ratio

Note that the opportunity cost of a can of cola is the *inverse* of the opportunity cost of a pizza.

One pizza costs 5 cans of cola.

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



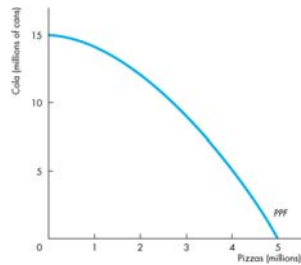
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Production Possibilities and Opportunity Cost

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.

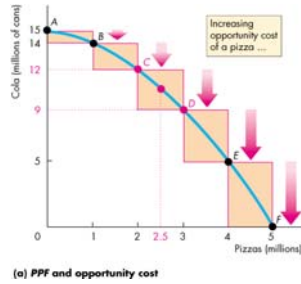
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Using Resources Efficiently

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.



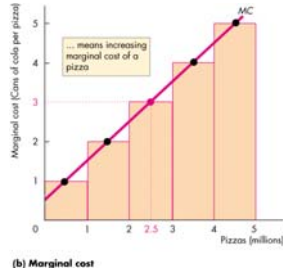
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Using Resources Efficiently

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 center of each bar.



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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.

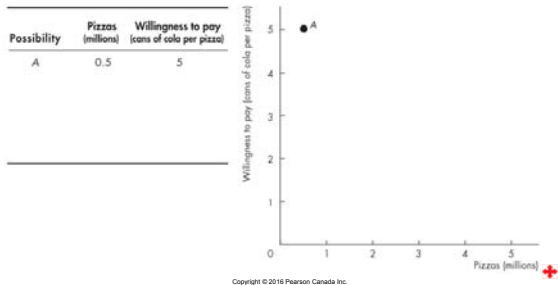
We call this general principle the *principle of decreasing marginal benefit*.

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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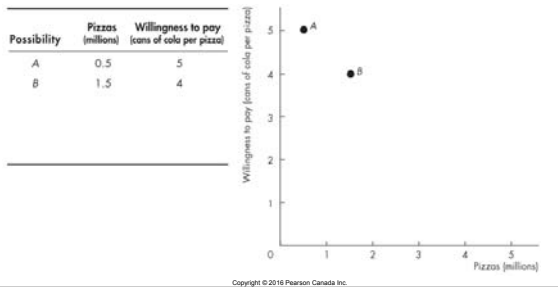
Using Resources Efficiently

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



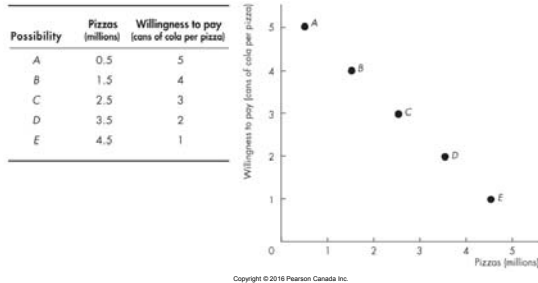
Using Resources Efficiently

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



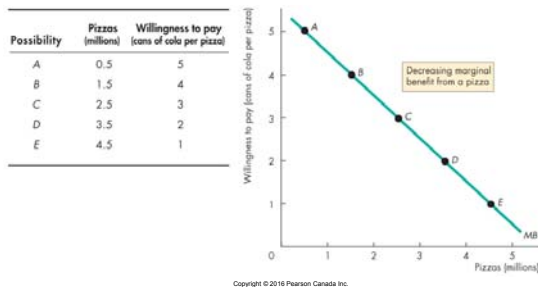
Using Resources Efficiently

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



Using Resources Efficiently

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



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.

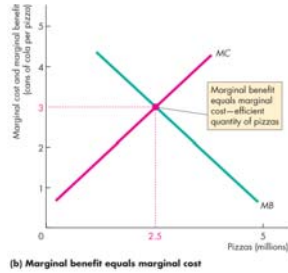
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Using Resources Efficiently

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.



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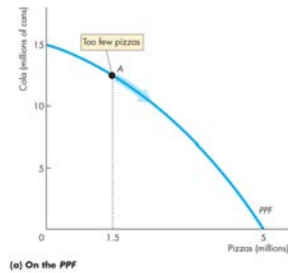
Using Resources Efficiently

If we produce fewer than 2.5 million pizzas, marginal benefit exceeds marginal cost.

We can get more value by producing more pizzas.

On the *PPF* at point A, we are producing 1.5 million pizzas, which is too few.

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



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Using Resources Efficiently

If we produce more than 2.5 million pizzas, marginal cost exceeds marginal benefit.

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

On the *PPF* at point C, we are producing 3.5 million pizzas, which is too many.

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



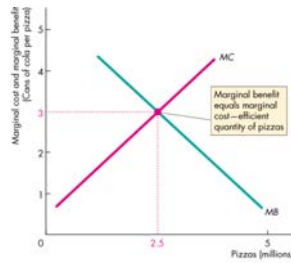
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Using Resources Efficiently

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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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.

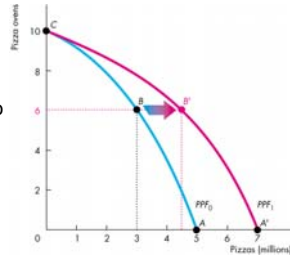
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Economic Growth

Figure 2.5 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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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.

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.

TABLE 2.1 Joe's Production Possibilities

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

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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.

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.

TABLE 2.2 Liz's Production Possibilities

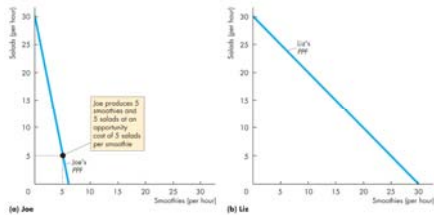
Item	Minutes to produce 1	Quantity per hour
Smoothies	2	30
Salads	2	30

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Gains from Trade

Figure 2.6 shows the production possibility frontiers.

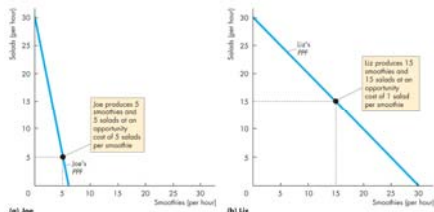
In part (a), Joe's opportunity cost of a smoothie is 5 salads. Joe produces at point A on his PPF.



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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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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

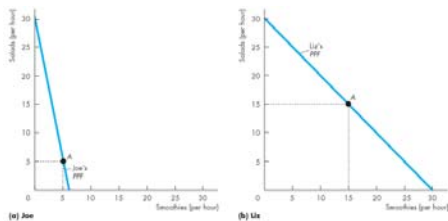
(a) Before trade	Liz	Joe
Smoothies	15	5
Salads	15	5
(b) Specialization	Liz	Joe
Smoothies	30	0
Salads	0	30
(c) Trade	Liz	Joe
Smoothies	sell 10	buy 10
Salads	buy 20	sell 20
(d) After trade	Liz	Joe
Smoothies	20	10
Salads	20	10
(e) Gains from trade	Liz	Joe
Smoothies	+5	+5
Salads	+5	+5

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Gains from Trade

Figure 2.7 shows the gains from trade.

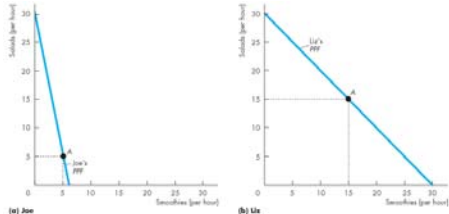
Joe's opportunity cost of producing a salad is less than Liz's. So Joe has a comparative advantage in producing salads.



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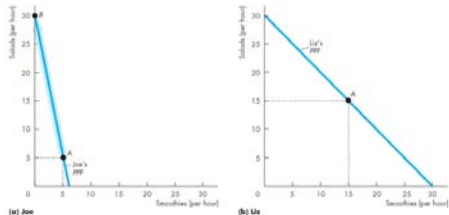
Gains from Trade

Liz's opportunity cost of producing a smoothie is less than Joe's.
 So Liz has a comparative advantage in producing smoothies.



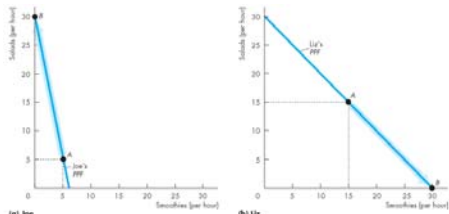
Gains from Trade

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



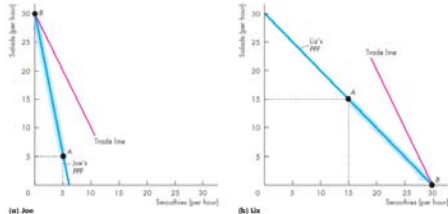
Gains from Trade

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



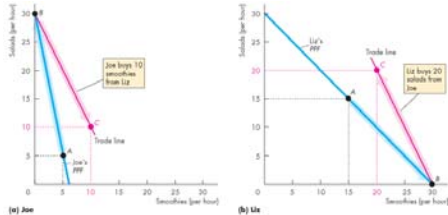
Gains from Trade

They trade salads for smoothies along the red "Trade line."
 The price of a salad is 2 smoothies or the price of a smoothie is $\frac{1}{2}$ of a salad.



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.



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

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

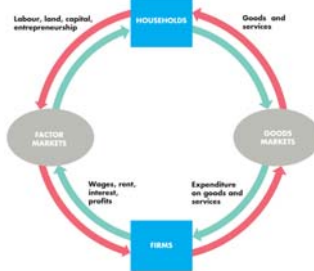
Circular Flows Through Markets

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.

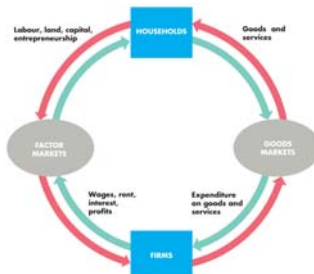


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Economic Coordination

Coordinating Decisions

Markets coordinate individual decisions through price adjustments.



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