CHAPTER 2

The Economic Problem

Grown for Biofuel
Learning objectives:

- The production possibilities frontier (PPF) and use it to calculate opportunity cost
- PPF, Preference and Efficiency
- Explain how current production choices expand future production possibilities
- Explain how specialization and trade expand production possibilities
- Describe the economic institutions that coordinate decisions
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.
Production Possibilities and Opportunity Cost

Production Possibilities Frontier

Figure 2.1 shows the PPF for two goods: cola and pizzas.
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.
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**.
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, some resources are either unemployed or misallocated.
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.
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.
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.
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 $\frac{1}{5}$ of a pizza.
Opportunity Cost Is a Ratio

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

As we move along the PPF, the opportunity cost of a pizza increases, so does the Marginal cost.

(a) PPF and opportunity cost
Preferences and Marginal Benefit

- **Preferences** are a description of a person’s likes and dislikes.

- 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.
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.
Using Resources Efficiently

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

<table>
<thead>
<tr>
<th>Possibility</th>
<th>Pizzas (millions)</th>
<th>Willingness to pay (cans of cola per pizza)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.5</td>
<td>5</td>
</tr>
</tbody>
</table>

![Graph showing point A]
Using Resources Efficiently

At point $E$, with pizza 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.

<table>
<thead>
<tr>
<th>Possibility</th>
<th>Pizzas (millions)</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>0.5</td>
<td>5</td>
</tr>
<tr>
<td>B</td>
<td>1.5</td>
<td>4</td>
</tr>
<tr>
<td>C</td>
<td>2.5</td>
<td>3</td>
</tr>
<tr>
<td>D</td>
<td>3.5</td>
<td>2</td>
</tr>
<tr>
<td>E</td>
<td>4.5</td>
<td>1</td>
</tr>
</tbody>
</table>
Production Efficiency and Allocative Efficiency

**Production Efficiency:**

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

⇒ Any point on PPF is a production efficient point

**Allocative Efficiency:**

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.
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.
If we produce fewer than 2.5 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 are producing too few pizzas.

We are better off moving along the PPF to produce more pizzas.
We get more value from our resources by producing fewer pizzas.

On the PPF at point C, we are producing too many pizzas.

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

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

The expansion of production possibilities—and 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*.
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.
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.
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 involve comparing productivities while comparative advantage involves comparing opportunity costs.

Let’s look at Liz and Joe who operate smoothie bars.
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>
<thead>
<tr>
<th>Item</th>
<th>Minutes to produce 1</th>
<th>Quantity per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoothies</td>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>Salads</td>
<td>2</td>
<td>30</td>
</tr>
</tbody>
</table>
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’s spend 10 minutes making salads and 50 minutes making smoothies, so he produces 5 smoothies and 5 salads an hour.

### TABLE 2.2 Joe’s Production Possibilities

<table>
<thead>
<tr>
<th>Item</th>
<th>Minutes to produce 1</th>
<th>Quantity per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoothies</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Salads</td>
<td>2</td>
<td>30</td>
</tr>
</tbody>
</table>
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.
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.
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**

<table>
<thead>
<tr>
<th></th>
<th>Liz</th>
<th>Joe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoothies</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Salads</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>(b) Specialization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoothies</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Salads</td>
<td>0</td>
<td>30</td>
</tr>
</tbody>
</table>
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 10 salads.
- Joe has 20 smoothies and 10 salads.

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<table>
<thead>
<tr>
<th>TABLE 2.3 Liz and Joe Gain from Trade</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Before trade</td>
</tr>
<tr>
<td>Smoothies</td>
</tr>
<tr>
<td>Salads</td>
</tr>
<tr>
<td>(b) Specialization</td>
</tr>
<tr>
<td>Smoothies</td>
</tr>
<tr>
<td>Salads</td>
</tr>
<tr>
<td>(c) Trade</td>
</tr>
<tr>
<td>Smoothies</td>
</tr>
<tr>
<td>Salads</td>
</tr>
<tr>
<td>(d) After trade</td>
</tr>
<tr>
<td>Smoothies</td>
</tr>
<tr>
<td>Salads</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Gains from Trade

Gains from trade:

- Liz gains 5 smoothies and 5 salads an hour
- Joe gains 5 smoothies and 5 salads an hour
Gains from Trade

Figure 2.6 shows the gains from trade.

Joe initially produces at point A on his PPF.

Liz initially produces at point A on her PPF.
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.
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 salad and he produces 30 salads an hour at point $B$ on his PPF.
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.
Economic Coordination

Circular Flows Through Markets

Figure 2.7 illustrates how households and firms interact in the market economy.

Factors of production, goods and services flow in one direction.

Money flows in the opposite direction.
Coordinating Decisions

Markets coordinate individual decisions through price adjustments.