Chapter 3: Interdependence and Gains from Trade

Start with material from chapter 2 ---

Simple economic model: The Production Possibilities Frontier (PPF)

Our first model: A PPF for an individual

Assumptions:

• Individual does two things:
  
  Studies
  Measure with GPA

  Parties
  Measure by dates per day
  Every date lasts one hour
  Quality of date does not matter --- all dates are the same
  Can have 24 dates in a day

Production Possibilities Frontier (PPF)

The PPF is the boundary between those combinations of goods and services that can be produced and those that cannot.

• Shows all combinations of output that the individual (economy) can possibly produce given the available resources and technology.

  ⇒ PPF shows all combinations of GPAs and dates you can obtain.

• Shows the limits to the production of the two goods given the total resources available to produce them.
Lessons

1. Some combinations of GPAs and dates are not attainable.

2. Points on the frontier are attainable.

3. Points within the frontier are also attainable.

4. Points along the frontier are efficient.

**Efficiency**

- An allocation is efficient if it is not wasteful.

- An allocation is efficient if there is no way to rearrange the use of resources to produce more output.
5. You can change from one point to another along the frontier --- BUT – it involves a tradeoff.

   The cost is an **opportunity cost**.

   The **opportunity cost** of an action is the highest valued alternative foregone.

   Opportunity cost of a higher GPA is less dates
   Opportunity cost of a better social life are points of GPA

   ⇒ If you are producing efficiently there is a tradeoff.

   Question: Is there a cost to moving from a point within the frontier to another point?

6. *The frontier is not necessarily the same for everyone*

7. *The frontier can change over time*

   Frontier shifts if you gain more skills since you are increasing your ability to convert resources to goods.
Second model: The PPF for a nation

Assumptions:

- Economy can produce only two goods: tapes and sodas.
- The quantities produced of all the other goods and services are constant (the *ceteris paribus* assumption)

*Ceteris paribus.* A Latin phrase, translated as “other things being equal,” used as a reminder that all variables other than the ones being studied are assumed to be constant.

<table>
<thead>
<tr>
<th>Possibility</th>
<th>Tapes (millions per month)</th>
<th>Soda (million bottles per month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>B</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>D</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>E</td>
<td>8</td>
<td>0</td>
</tr>
</tbody>
</table>
Production Efficiency

Production efficiency: we cannot produce more of one good without producing less of some other good.

- A point inside the PPF is inefficient.
  
  What’s going on here?
  ♦ Resources are unemployed, and/or
  ♦ Resources are misallocated

- At an efficient allocation there are no unemployed resources and they are allocated to the place they are best suited.

- Can you change from one point to another along the frontier?
  
  ♦ Yes, but there is a cost to rearranging resources.

  ♦ Gain tapes at the cost of foregone soda.

  ♦ The PPF shows the opportunity cost of one good measured in terms of the other good.
Let’s calculate the opportunity cost of moving along from A to B to C ....

<table>
<thead>
<tr>
<th>Possibility</th>
<th>Tapes (millions per mo.)</th>
<th>Soda (million bottles per mo.)</th>
<th>Opportunity cost of Tapes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0</td>
<td>20</td>
<td>lose 2 m. bottles soda = 1 bottle/tape gain 2 m. tapes</td>
</tr>
<tr>
<td>B</td>
<td>2</td>
<td>18</td>
<td>lose 4 m. bottles soda = 2 bottles/tape gain 2 m. tapes</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>14</td>
<td>lose 6 m. bottles soda = 3 bottles/tape gain 2 m. tapes</td>
</tr>
<tr>
<td>D</td>
<td>6</td>
<td>8</td>
<td>lose 8 m. bottles soda = 4 bottles/tape gain 2 m. tapes</td>
</tr>
<tr>
<td>E</td>
<td>8</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
Increasing opportunity costs

As more of a product is produced, the opportunity cost of additional units rises.

The more tapes we make the higher is the opportunity cost.

A graphical explanation is next
Economic Growth

Can the PPF change over time?

Yes – this is economic growth – an expansion of production

What fuels economic growth?

A change in limits –

1. **Capital accumulation** – the growth of capital resources

2. **Technological change** – the development of new goods and of better ways of producing goods and services.

3. **Specialization and trade**.
Chapter 3

GAINS FROM TRADE

The rancher and the farmer should be friends!

The Model

Rancher can only produce meat and farmer can only produce potatoes.

(Farmer eats potatoes, rancher eats meat. Gains from trade are obvious.)

New Model

1. Rancher and farmer can do both activities but only at great cost.

(Rancher can grow potatoes but land is not well suited for it. Farmer can raise cattle but is not very good at it.)

2. Rancher is better at both than the farmer.
Economic question: Are there gains from trade?

Assumptions:
- Each works 40 hours a week
- Each can divide time between growing potatoes and raising cattle

<table>
<thead>
<tr>
<th>Hours needed to make 1 pound of:</th>
<th>Amount produced in 40 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Meats</td>
</tr>
<tr>
<td></td>
<td>Potatoes</td>
</tr>
<tr>
<td>Farmer</td>
<td>20 hours/lb</td>
</tr>
<tr>
<td></td>
<td>10 hours/lb</td>
</tr>
<tr>
<td></td>
<td>2 lbs</td>
</tr>
<tr>
<td></td>
<td>4 lbs</td>
</tr>
<tr>
<td>Rancher</td>
<td>1 hours/lb</td>
</tr>
<tr>
<td></td>
<td>8 hours/lb</td>
</tr>
<tr>
<td></td>
<td>40 lbs</td>
</tr>
<tr>
<td></td>
<td>5 lbs</td>
</tr>
</tbody>
</table>

Notes:
1. Rancher better at everything.
2. We can draw his PPF.

All time to meat  \Rightarrow 40 \text{ hours} \times \frac{1 \text{ lb.}}{\text{hour}} = 40 \text{ pounds of meat}

All time to potatoes \Rightarrow 40 \text{ hours} \times \frac{1 \text{ lb.}}{8 \text{ hours}} = 5 \text{ pounds of potatoes}

\frac{1}{2} \text{ time to meat} \Rightarrow 20 \text{ hours} \times \frac{1 \text{ lb.}}{\text{hour}} = 20 \text{ pounds of meat}

\frac{1}{2} \text{ time to potatoes} \Rightarrow 20 \text{ hours} \times \frac{1 \text{ lb.}}{8 \text{ hours}} = 2\frac{1}{2} \text{ pounds of potatoes}
3. The rancher faces a tradeoff – one of the big ideas of economics.

4. The rancher’s PPF is a straight line.
   
   Slope of line is $\Delta y/\Delta x = 40/5 = 1/8$

5. Can also draw farmers PPF.
Assume that they trade

*Proposal:*

*Farmer specializes in potatoes*

*Rancher spends 24 hour raising cattle and 16 hours farming*

Rancher trades 3 pounds of meat for 1 pound of the farmers potatoes

*Red signifies trade from rancher to farmer*

*Green signifies transfer from farmer to rancher*

<table>
<thead>
<tr>
<th>Point</th>
<th>Meat</th>
<th>Potatoes</th>
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<tbody>
<tr>
<td>Farmer</td>
<td>A*</td>
<td>0 + 3 = 3 4 - 1 = 3</td>
</tr>
<tr>
<td>Rancher</td>
<td>B*</td>
<td>24 - 3 = 21 2 + 1 = 3</td>
</tr>
</tbody>
</table>

*Red signifies trade from rancher to farmer*

*Green signifies transfer from farmer to rancher*

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</table>
Notes:

1. The rancher and the farmer should be friends!

2. In what sense are they specializing in what they do best?

   Look at who can produce potatoes at a lower cost.

   Rancher needs 8 hours to produce a pound.

   Farmer needs 10 hours to produce a pound.

3. Absolute advantage

   **Absolute advantage** = the comparison among the producers of a good according to their productivity.

   The producer that requires a smaller quantity of inputs to produce a good is said to have an **absolute advantage** in producing that good.

   Rancher has an absolute advantage in producing meat!
4. What other way can we look at the cost of producing potatoes?

Opportunity cost of producing 1 pound of potatoes for rancher = 8 hours = 8 pounds meat

Opportunity cost of producing 1 pound of potatoes for farmer = 10 hours = 1/2 pounds meat

<table>
<thead>
<tr>
<th></th>
<th>Opportunity cost of:</th>
<th>1 pound meat</th>
<th>1 pound potatoes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer</td>
<td></td>
<td>2 lbs. Potatoes</td>
<td>1/2 pound meat</td>
</tr>
<tr>
<td>Rancher</td>
<td></td>
<td>1/8 lbs. Potatoes</td>
<td>8 pounds meat</td>
</tr>
</tbody>
</table>

- Note inverse relationship
  - farmer has lower opportunity cost of potatoes
  - rancher has lower opportunity cost of meat

**Comparative advantage** = the comparison among producers of a good according to their opportunity cost

Farmer’s comparative advantage is in potatoes (farming)
Ranchers comparative advantage is in meat (ranching)

5. Differences in comparative advantage and opportunity cost create gains from trade.

Benefit arises because each person concentrates on the activity for which he or she has the lower opportunity cost. Trade can benefit everyone one in society because it allows people to specialize in activities in which they have a comparative advantage.
International Trade
A Practical Example of Gains from Trade

Question: Should the U.S. trade with other countries?

Aside:
Goods produced abroad and sold domestically are called imports

Goods produced domestically and sold abroad are called exports

Model
• Two countries: Japan and U.S.
• Two goods: Cars and food

<table>
<thead>
<tr>
<th></th>
<th>Cars per month</th>
<th>Food per month (tons)</th>
<th>Opportunity cost of a car</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japanese worker</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>U.S. worker</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Results:
• Japan has comparative advantage in cars.
• There are gains to trade!