**Comparative Advantage: The Basis of Exchange**

Why do people exchange goods and services in the first place? Why not just produce our own food, cars, clothing, shelter, and the like? The answer is that we can all have more of every good and service if we specialize in the activities at which we are relatively most efficient.

**Example 4.1.** Consider Ted, a house painter whose roof needs fixing and Tom, a roofer whose house needs painting. Although Ted is a painter, he also knows how to repair roofs. Tom, for his part, knows how to paint houses. The time each requires to perform these tasks is given in the table. How should the roofing and painting jobs be allocated among them?

<table>
<thead>
<tr>
<th></th>
<th>Painting</th>
<th>Roofing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ted</td>
<td>300 hours</td>
<td>400 hours</td>
</tr>
<tr>
<td>Tom</td>
<td>200 hours</td>
<td>100 hours</td>
</tr>
</tbody>
</table>

Note in the table that Tom has an **absolute advantage** over Ted at both painting and roofing, which means that Tom takes fewer hours to perform each task than Ted does.

At first glance, this might seem to suggest that Tom do the roofing and painting jobs for both houses. Of course, Tom would probably object to this proposal as being unfair. But an even more telling objection is that it is inefficient. The reason is that Ted has a **comparative advantage** over Tom at painting, which means that he is relatively more efficient at painting than Tom is. The word "relatively" is the key word here. For Ted to be relatively more efficient at a task is for him to have a lower opportunity cost of performing that task than Tom has.

For Ted, the opportunity cost of painting one house = 0.75 roofing jobs
For Tom, the opportunity cost of painting one house = 2 roofing jobs.
Ted thus has a comparative advantage at painting, and it makes sense for him to do both painting jobs, leaving both roofing jobs for Tom.

Note that if each person performed both tasks for himself, the total time spent would be 700 hours for Ted and 300 hours for Tom. By contrast, when each specializes in his comparative advantage, these totals fall to 600 for Ted and 200 for Tom, a savings of 100 hours each.

**The Principle of Comparative Advantage:**

Everyone does best when each person (or country) concentrates on the activities in which he or she is relatively most efficient.

Specialization by comparative advantage provides the rationale for market exchange. It explains why each person does not devote 10 percent of her time to producing cars, 5 percent to growing food, 25 percent to building housing, 0.0001 percent to brain surgery, and so on. By performing only those tasks at which we are relatively most efficient, we can produce vastly more than if we each tried to be self-sufficient.

**Caution:** Pay close attention to the form in which the productivity information is provided. Your goal in each case is to find each person’s opportunity cost of producing the good in question.

**Example 4.2.** Arthur can milk a goat in 10 minutes and shear a sheep in 4 minutes. Ben can milk a goat in 6 minutes and shear a sheep in 3 minutes. Which statement below is true?

a. Arthur has no comparative advantage.
b. Ben should do both tasks because he has an absolute advantage in both.
c. Arthur has a comparative advantage in shearing sheep and Ben has a comparative advantage in milking goats.
d. Arthur has a comparative advantage in milking goats and Ben has a comparative advantage in shearing sheep.
e. None of the above statements is true.

Arthur’s opportunity cost of milking a goat is 10/4=2.5 sheep shorn.
Ben’s opportunity cost of milking a goat is 6/3=2 sheep shorn.
It is more costly for Arthur to milk a goat than for Ben, so Ben has a comparative advantage in milking goats. Arthur’s opportunity cost of shearing a sheep is 4/10 = 0.4 goats milked.
Ben’s opportunity cost of shearing a sheep is 3/6 = 0.5 goats milked.
It is more costly for Ben to shear a sheep than for Arthur, so Arthur has a comparative advantage in shearing sheep.
Correct answer = c.

Example 4.3. Arthur can milk 10 goats per hour or shear 4 sheep per hour. Ben can milk 6 goats per hour or shear 3 sheep per hour. Which statement below is true?
a. Arthur has no comparative advantage.
b. Ben should do both tasks because he has an absolute advantage in both.
c. Arthur has a comparative advantage in shearing sheep and Ben has a comparative advantage in milking goats.
d. Arthur has a comparative advantage in milking goats and Ben has a comparative advantage in shearing sheep.
e. None of the above statements is true.

Arthur’s opportunity cost of milking 10 goats is 4 sheep shorn, so his opportunity cost of milking 1 goat is 0.4 sheep shorn.
Ben’s opportunity cost of milking 6 goats is 3 sheep shorn, so his opportunity cost of milking 1 goat is 0.5 sheep shorn.
It is more costly for Ben to milk a goat than for Arthur, so Arthur has a comparative advantage in milking goats. Arthur’s opportunity cost of shearing 4 sheep is 10 goats milked, so his opportunity cost of shearing 1 sheep is 2.5 goats milked.
Ben’s opportunity cost of shearing 3 sheep is 6 goats milked, so his opportunity cost of shearing 1 sheep is 2 goats milked.
It is more costly for Arthur to shear a sheep than for Ben, so Ben has a comparative advantage in shearing sheep.
Correct answer = d

Production Possibilities in a One-Person Economy

Example 4.4 Chris can produce 6 sq yd/wk of shelter or 12 lb/wk of food. If Chris is the only person in the economy, describe the economy's production possibilities curve.

The absolute value of the slope of the production possibility curve is 6/12 = 1/2. For Chris, this means that the opportunity cost of an additional pound of food each week is 1/2 sq yd/wk of shelter.
Example 4.5. Dana can produce 4 sq yd/wk of shelter and 4 lb/wk of food. If Dana is the only one in the economy, describe the economy's production possibilities curve.

For Dana, the opportunity cost of an additional pound of food each week is 1 sq yd/wk of shelter.

Production Possibilities in a Two-Person Economy

In the examples above, Chris has a comparative advantage in producing food, because the opportunity cost of producing food is only half as large as it is for Dana. By the same token, Dana has a comparative advantage producing shelter.

Example 4.6. Chris can produce 6 sq yd/wk of shelter or 12 lb/wk of food. Dana can produce 4 sq yd/wk of shelter and 4 lb/wk of food. If Chris and Dana are the only two people in the economy, describe the economy's production possibilities curve.

Example 4.7. Dana and Chris, a married couple, have decided to consume, jointly, 6 sq yd/wk of shelter and 8 lb/wk of food. How should they divide the task of producing these quantities?

Dana has a comparative advantage in producing shelter, but even if he spends all his time producing shelter, he can make only 4 sq yd/wk. So Chris will have to produce the additional 2 sq yd/wk for them to achieve the desired 6 sq yd/wk. Since Chris is capable of producing 6 sq yd/wk of shelter on her own, it will take her only 1/3 of a week to produce 2 sq yd. This leaves 2/3 of a week for her to produce food, which is exactly how much time she needs to produce the desired 8 lb/wk.
The Principle of Increasing Opportunity Cost (Also called “The Low-Hanging-Fruit Principle”)

In expanding the production of any good, first employ those resources with the lowest opportunity cost, and only afterward turn to resources with higher opportunity costs.

Example 4.8. Chris and Dana are now joined by George, whose production-possibilities curve is shown below. What is the production-possibilities curve for the new economy consisting of Chris, Dana, and George?

George's opportunity cost of producing 1 pound per week of food = 2 sq yds/wk of shelter.
Recall Chris's = 1/2 sq yd/wk of shelter
Dana's = 1 sq yd/wk of shelter

Example 4.9. If the economy consisting of Chris, Dana, and George is to produce 14 lbs/wk of food and 4 sq yds/wk of shelter, how should each person's work time be allocated?
Chris: 0 sq yds/wk of shelter, 12 lbs/wk of food.
Dana: 2 sq yds/wk of shelter, 2 lbs/wk of food.
George: 2 sq yds/wk of shelter, 0 lbs/wk of food.

**The Production Possibilities Curve for an Economy with Many Workers**

Intuitive interpretation of its shape: Produce the initial units of clothing using the resources that are relatively most efficient at clothing production, and only then turn to those that are relatively less efficient at clothing production.