Microeconomics
Topic 2: "Explain the principle of comparative advantage
and how it leads to specialization and gains from trade."

Reference: Gregory Mankiw's *Principles of Microeconomics*, 2nd edition, Chapter 3.

Why People and Countries Trade

This section lays the foundation for why countries and individuals gain from trade. Countries usually trade to buy goods that are produced at a lower cost elsewhere. Countries and people have different costs of production or (to put it differently) different abilities in producing goods. They can take advantage of their differences in order to make themselves better off. When they do this, they experience gains from trade.

The following concepts are important in understanding gains from trade:

- Opportunity cost: a cost that is measured in terms of what you give up of some other good. Time spent producing cars is time taken away from producing bread, and vice versa. Note that when we discuss gains from trade, the opportunity cost is not measured in dollars but in units of some good or activity that is given up. For a review of opportunity cost, see the notes for Micro Topic 1.

- Absolute advantage: The person or country that produces a good with a smaller quantity of inputs, or that produces more output *per* unit of input, is said to have an absolute advantage in producing that good.

- Comparative advantage: The person or country that has the *smaller* opportunity cost of producing a good is said to have a comparative advantage in producing that good. Comparative advantage determines which country will *specialize* in which good.

The gains from trade are only based on comparative advantage**,** *not* on absolute advantage. A country or person can have an absolute advantage in both goods or activities, and yet still gain from trade by specializing in the good or activity in which it has a comparative advantage.

We will go over an example very carefully, step by step, to highlight all the important concepts associated with the topic of "gains from trade and comparative advantage."

Calculating Absolute and Comparative Advantage

Martha and Sheldon wallpaper and paint rooms. In one week, Martha can paint 20 rooms or wallpaper 5 rooms. In the same amount of time, Sheldon can paint 10 rooms or wallpaper 4 rooms. The information is usually summarized in a table like this one:

Table 1: Production Possibilities for 1 Week

	Rooms Finished in 1 Week

	Paint	Wallpaper
Martha	20	5
Sheldon	10	4

If they want, Martha and Sheldon can also split their time between activities. For example, Martha could spend 50% of her week on painting and 50% of her week on wallpapering, to produce 10 painted rooms and 2.5 wallpapered rooms.

Using the information here, we can determine absolute advantage. Since Martha can produce more painted rooms than Sheldon in the same amount of time (20 > 10), she has the absolute advantage in painting. Since she can produce more wallpapered rooms than Sheldon in the same amount of time (5 > 4), she also has the absolute advantage in wallpapering.

The goal of this exercise is to show you that Martha and Sheldon are better off if they specialize in the good in which they have a comparative advantage and then trade, rather than trying to produce everything for themselves and not trading. This is true even though Martha has the absolute advantage in both activities.

Let's start with the case of no trade, and assume that each person spends half a week on each activity. The resulting output is given in Table 2.

Table 2: Production without Specialization

Martha		**Sheldon**	
Rooms Painted	**Rooms Wallpapered**	**Rooms Painted**	**Rooms Wallpapered**
10	**2.5**	**5**	**2**

For future reference, notice that the total production is 15 (10 + 5) rooms painted and 4.5 (2.5 + 2) rooms wallpapered.

Remember that the person who has the smaller opportunity cost is said to have a comparative advantage. Therefore, we need to calculate the opportunity cost of each activity for each person. This is a very crucial step, so make sure you understand how it is done!

Let us start with the opportunity cost of painting. By looking at Table 1, we can see that when Martha paints 20 rooms, she gives up wallpapering 5 rooms. Divide both numbers by 20 and we find that when Martha paints 1 room, she gives up wallpapering 5/20 or 0.25 rooms. So for Martha, the opportunity cost of 1 painted room is 0.25 wallpapered rooms.

Now we repeat the process for Sheldon. For him, painting 10 rooms means not wallpapering 4 rooms. Dividing both numbers by 10, we find that when Sheldon paints 1 room, he gives up wallpapering 0.4 rooms. So for Sheldon, the opportunity cost of 1 painted room is 0.4 wallpapered rooms.

Because Martha's opportunity cost of painting is *smaller* than Sheldon's opportunity cost of painting (0.25 < 0.4), we conclude that Martha has the comparative advantage in painting.

> In general, the opportunity cost of good X is the number of units of good Y the person (or country) would have to give up in order to produce an extra unit of good X. The opportunity cost of good X in terms of good Y can be calculated like so: divide the total output of good Y that a person (or country) is capable of producing by the total output of good X that a person (or country) is capable of producing. That will give you the opportunity cost of X in terms of Y.

Next we look at the opportunity cost of wallpapering. We use the same method as above, but this time we divide the production of painting by the production of wallpapering (instead of the reverse). It turns out that Martha's opportunity cost of wallpapering 1 room is 4 rooms painted, while Sheldon's opportunity cost of wallpapering 1 room is 2.5 rooms painted.

Because Sheldon's opportunity cost of wallpapering is *smaller* than Martha's opportunity cost (2.5 < 4), we conclude that Sheldon has the comparative advantage in wallpapering.

> Tip: With two activities (or goods), a person (or country) cannot have a comparative advantage in both activities (or goods). Therefore, if one has the comparative advantage in painting, the other will have the comparative advantage in wallpapering.

Specialization and Trade

In general, a person (or country) will specialize in the activity in which she has a comparative advantage. In our example, Martha will specialize in painting. She will paint more and wallpaper less. Sheldon, in turn, will specialize in wallpapering. He will wallpaper more and paint less. (Note that they don't have to completely specialize by devoting all of their time to one activity.)

Let's assume that Martha will devote 70% of her week to painting and 30% of her week to wallpapering, while Sheldon will devote 25% of his week to painting and 75% of his week to wallpapering. (Note that we could have chosen other combinations of time spent painting and wallpapering. These numbers were adopted for simplicity.) Given the hours chosen, Martha and Sheldon will produce the following outputs in one week:

Table 3: Production with Specialization

Martha		**Sheldon**	
Rooms Painted	**Rooms Wallpapered**	**Rooms Painted**	**Rooms Wallpapered**
14	**1.5**	**2.5**	**3**

If you compare the outcome in Table 3 to the situation without specialization in Table 2, you will see that we have the same amount of wallpapered rooms as before (1.5 + 3 =

4.5), but more rooms painted now (14 + 2.5 = 16.5). We have increased the number of rooms painted by 1.5 *without* lowering the number of rooms wallpapered! This is the gain from specialization.

But even if the total production is higher, does that mean *both* Martha and Sheldon are better off specializing? The answer is yes, if they engage in trade.

In the real world, trade is accomplished by selling goods at market prices. But since we don't have dollar prices in this example, we need to figure out the exchange price of painting in terms of wallpapering and the exchange price of wallpapering in terms of painting. Logic tells us that the seller of the activity will never voluntarily sell for a price below her opportunity cost, as she would lose money. Similarly, the buyer of an activity will never voluntarily pay a price higher than her opportunity cost, as she could just produce the activity herself at lower cost.

In our case, the "price" of, say, wallpapering will be between the range of 2.5 rooms painted (opportunity cost of the seller, Sheldon) and 4 rooms painted (opportunity cost of the buyer, Martha). The exact exchange price will depend on the bargaining powers of the traders. Let's assume that Sheldon and Martha will exchange 1 room wallpapered for 3 rooms painted.

> Note: the exchange price (the price of good X in terms of good Y) must lie somewhere between the opportunity costs (of good X in terms of good Y) of the two traders. You will *always* be given the exact exchange price because it cannot be determined from the information given here.

Think of the exchange price in this way: Martha will go to Sheldon's house and paint 3 rooms, while Sheldon will go to Martha's house and wallpaper 1 room. That's the trade. The resulting exchange will provide the following outputs in one week:

Table 5: Consumption with Specialization and Trade

Martha		**Sheldon**	
Rooms Painted	**Rooms Wallpapered**	**Rooms Painted**	**Rooms Wallpapered**
14 – 3 = **11**	1.5 + 1 = **2.5**	2.5 + 3 = **5.5**	3 – 1 = **2**

Notice that Martha is better off with specialization and trade than she was without trade (in Table 2), because she has just as many wallpapered rooms (2.5) but one more painted room (11). Sheldon is also better off with specialization and trade, because he has just as many wallpapered rooms (2) but one-half more painted rooms (5.5). So Martha and Sheldon both gain from trade.

Major insights: Martha's absolute advantage in wallpapering and painting means that she is better at both activities than Sheldon is. Yet, even though Sheldon is worse at painting and wallpapering, he has a comparative advantage in wallpapering -- the activity in which he is the least inefficient. Thus, Martha can gain by having Sheldon wallpaper 1 of her rooms even though she could have wallpapered the room faster than Sheldon did. This

exchange allowed Martha to specialize in painting -- the activity in which she is even more efficient.

We have focused on trade between individuals, but our insights apply to trade between nations as well. The gains from trade are obvious when one country is better at producing one good and its trading partner is better at producing another. It is less obvious, but also true, that if one country is better at producing everything, then both countries can still gain from trade.