35 COMPARATIVE ADVANTAGE

Purposes: To show the difference between Absolute Advantage and Comparative Advantage in production, and to explain the implications of the Theory of Comparative Advantage for trade and exchange. In particular, you will learn why specialization in production and trade with others leads to greater world production, than if each country tries to be self-sufficient.

Computer file: **compad198.xls**.

Discussion:

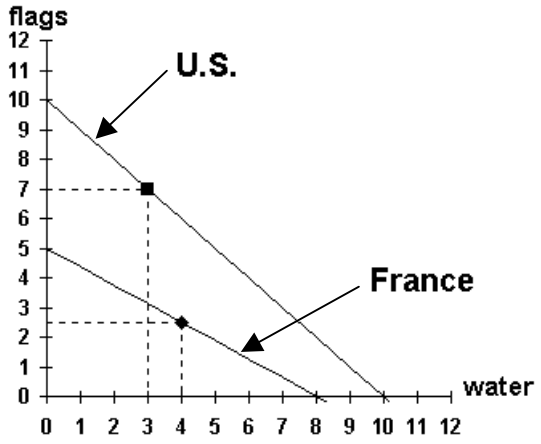
Here is the typical scenario. Consider the simple example of two countries, the U.S. and France, both of which can produce water and flags. We begin by assuming some labor productivities in the two countries displayed in the following table, which shows the daily output per worker in both France and the U.S. in producing the goods.

Output of one more worker

	WATER	FLAGS
U.S.	10.00	10.00
FRANCE	8.00	5.00

For example, a typical U.S. worker can produce 10 flags per day, or 10 cases of bottled water per day. French workers are less productive (perhaps because they are less educated, or have less capital to work with), producing either 5 flags or 8 cases of water per day. Economists say that the U.S. has an *absolute advantage* in producing both goods because U.S. workers have greater output per worker, 10 versus 8 for water, and 10 versus 5 for flags.

The figure at the right shows these data in graphical form. The vertical axis shows production of a typical worker in the flag industry, and the horizontal axis shows the production of a typical worker in the water industry. The straight line labeled "U.S." shows the output of a typical worker in the U.S. for the various ways that worker can be employed. For example, the point on the line shows the typical U.S. worker producing seven flags and three cases of water. (You can, if you wish, think of the point as the result of 70 percent of the workers in the U.S. being the flag industry,



and the rest being in the water industry.) You would be correct in thinking of the two straight lines in the figure as being production possibilities curves in the two countries.

The line for France has a similar interpretation. A French worker who produces only water can produce 8 cases per day. The point on the line showing production of 4 water and 2.5 flags means that half the worker's effort goes into making water, and half into flags. If she worked exclusively producing flags her output would be 5 flags per day. That the U.S. has an *absolute advantage* in both goods shows up in the graph as the production possibilities line for the U.S. lying completely "outside" that for France.

Now let's look at *comparative advantage*. A country has a comparative advantage in producing a good if it can produce extra units of a good at lower opportunity cost than the other country. Remember that the opportunity cost of producing of water, say, is the number of flags the country must give up in order to produce one more unit of water. In our example, the U.S. can produce one more unit of water by giving up one more flag. (Look at the figure and see that the slope of the line for U.S. production is minus one.) France, on the other hand must give up only 5/8 of a flag to get one more water. (See that the slope of the line for France is minus 5/8.) France can produce an extra unit of water more cheaply than the U.S. The opportunity cost of water in each country is the numerical value of the slope of the country's production possibilities curve. The ppc for France is flatter, with a slope of –5/8, or –0.625, than the ppc for the U.S., with a slope of –1.0. Producing another unit of water costs less in France than in the U.S.

Even though French workers are less efficient than the U.S., they can produce extra water at a lower cost, and we say France has a *comparative advantage* in water production. And the U.S. has a comparative advantage in flag production. Unless the two production possibilities curves are parallel, a country will always have a comparative advantage in some good. And the other country will have a comparative advantage in the other good.

For comparative advantage it is the slopes of the production possibilities curves that matter, not whether they cross or whether one is "outside" the other.

The theory of comparative advantage states that a country should specialize in the production of the good in which it has a comparative advantage. So France should try to specialize in water production, and the U.S. in flag production. We would therefore expect France to be an exporter of water, sending some to the U.S. in exchange for flags. The countries will both want to do this – it's in their mutual self-interest – because doing so will mean more flags and water for everyone.

The theory of comparative advantage says that even if a country is better at producing *everything* it will still benefit from specializing in the production of one of the goods, and engaging in trade to acquire what it desires of the other good. This is because even when one country is better at producing everything, both countries can benefit from specialization and trade because total world production of both goods will be greater.

This is a truly amazing claim if you stop to think about it. If it is true, and as we shall see, it certainly is, then even the richest country can benefit from trade with the poorest country, and *both* countries will benefit.

Comparative advantage is rife with policy implications. It suggests, among other things, that interfering with free trade, through a system of government tariffs and quotas will reduce the mutual benefits from specialization and exchange. Economists are, for the most part, vigorous advocates of free trade!

Recap

1) A country has a comparative advantage in producing a good when the country can produce the good at lower (marginal) opportunity cost.
2) A country should specialize in the production of the good in which it has a comparative advantage, and trade with other countries to achieve the desired consumption levels of goods it doesn't produce.
3) Unless the countries have exactly the same costs (their production possibilities curves are parallel), then specialization and trade will be advantageous.
4) Absolute advantage has nothing to do with whether trade takes place, or with who should specialize in producing which goods. The absolute advantage in the example simply means that the U.S. is a richer country than France. But that has no bearing on whether they can gain from trade.

Answering the questions

Open the Excel file **compad198.xls**. What you will see is the same graph and table of input productivities in the U.S. and France we used in the earlier example. In addition, you will see two more tables. The first shows productivity in the two countries in terms of input requirements (workers required per flag or per case of water) instead of the outputs per worker. But these two ways of describing productivity are linked to each other. For example, if daily output per worker in the U.S. is ten flags, then the input requirement for producing one flag is 0.1 workers. The reason for including the table with input requirements is that some instructors prefer to talk about absolute and comparative advantage in those terms. So the data are included here. You won't need the data on input requirements to get the answers in this problem set. You can experiment with the labor productivities by changing the values in the top table, and seeing what happens to the table of input requirements.

The remaining table, at the bottom of the spreadsheet, shows production of the goods in the two countries. You can change the amount of water produced in each, and Excel computes the resulting amount of flags. These are the numbers you will change to show what happens to each countries production when they operate in isolation, and when they can specialize and trade with each other.

To work through the details, we need to make some simple assumptions about how much water and flags the people in France and the U.S. want to consume. Our working assumption is that people in both countries want to consume equal amounts of flags and water. For example, if the U.S. produced flags and water on its own it would want to produce half water and half flags, and be at the point 5 flags and 5 cases of water on the graph. Similarly, if the French had the same tastes, and did not trade or specialize in production, then they would want to be at the point 2.5 flags and 4 water on their production possibilities curve.

One consequence of our assumption about demand is that it won't make sense to produce anything other than equal amounts of the two goods in total. This will mean, in turn, that when countries specialize in production the specialization may not be complete. Consult the Hints and tips section below to get help with this problem with this while you are answering the questions.

Hints and tips:

1) Keep your eye on the main point: Specialization leads to larger world production of goods than if countries just produced and consumed in isolation.

2) For questions 7 and 8 you can use Goal Seek to make (water – flags) equal to zero by changing the amount of water for each country.

3) After you answer question 12, but before you answer question 13, notice that the total number of flags produced is not equal to the number units of water produced. This shows up at the –2.00 in cell F26. So with these production levels it's not possible to meet our requirement that equal amounts of the goods are consumed. For question 13, it's easy to make the appropriate adjustment in production using Goal Seek. You'll want to make cell F26 equal to zero by changing cell D24, the U.S. production of water. Countries specialize, but not completely. The U.S. will want to produce a little bit of water, even though it specialized in the production of flags.

4) This problem set doesn't include the usual randomization of parameters that you'll find in other problem sets. Everyone's questions and answers here are the same. To try your hand at different configurations of absolute and comparative advantage try out the next problem set.

MATH MAVEN'S CORNER: The equation of the U.S. production possibilities curve is $F = 10 - W$, where F and W are the amounts of flags and water produced, respectively. For France, the curve is $F = 5 - (5/8)W$. In the absence of specialization and trade, requiring that consumption of the two goods be the same means finding where $F = W$ crosses the production possibilities curve for a country.

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Questions

For all of the questions in this problem set be sure that U.S. output per worker is 10 for both water and flags, and the French output per worker is 8 for water and 5 for flags.

1. Which country has the absolute advantage in the production of water? (Enter "France" or "U.S.")

2. Which country has the absolute advantage in the production of flags? (Enter "France" or "U.S.")

3. What is the opportunity cost of water (in terms of flags) in France?

4. What is the opportunity cost of water (in terms of flags) in the U.S.?

5. Which country has the comparative advantage in water production? (Enter "France" or "U.S.")

6. Which country has the comparative advantage in flag production? (Enter "France" or "U.S.")

7. The preferences of U.S. residents are to consume equal amounts of water and flags. In the absence of trade, what amount of water (or flags) will be produced in the U.S.?

   [Be sure this amount of water is entered in cell D24 of the worksheet.]

8. The preferences of the French are also to consume equal amounts of water and flags. In the absence of trade, what amount of water (or flags) will be produced in France?

   [Again, be sure the amount is entered in cell D25 of the worksheet.]

9. Under the assumptions about preferences in questions 7. and 8., what is the world production of water in the absence of trade?

10. Continuing on from the last question, what is the world production of flags in the absence of trade?

11. If France specializes completely in the good in which it has a comparative advantage, how much water will she produce? (Be sure this value is entered in the correct cell of the COMPAD worksheet.)

12. Continuing on from the last question, if the U.S. specializes completely in the good in which it has a comparative advantage, how much water should it produce? (Be sure this value is entered in the correct cell of the COMPAD worksheet.)

13. What level of U.S. water production would allow both specialization and equal flag and water consumption in the world? [Hint: Specialization is not complete here. Use Goal Seek to get total (Water – Flags) equal to zero by changing the U.S. production of water.]

14. Given equal production of water and flags for the world, what's the new world production of water after specialization (as in question 13) takes place?

15. Given equal production of water and flags for the world, what's the new world production of flags after specialization takes place?

16. What's the world gain in flag production after specialization?

17. What's the world gain in water production after specialization?

18. Suppose France gets ALL the gains from trade. [I.e., U.S. consumption after trade is 5 water and 5 flags.] What is the French consumption of water after trade?

19. Following on from the last question, what is the French consumption of flags after trade?