36 MORE COMPARATIVE ADVANTAGE

Purposes: To provide a training ground for learning about the theory of comparative advantage and the gains in output that result from countries specializing in production and trading with each other.

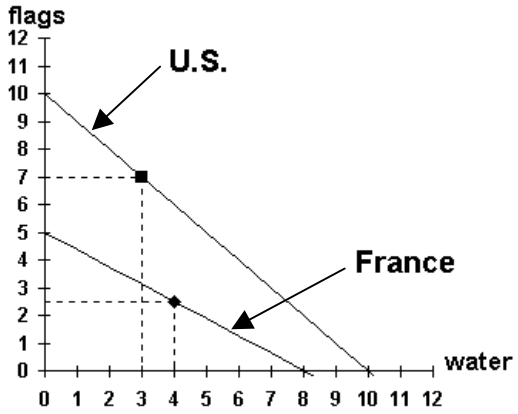
Computer file: **compad298.xls**.

Discussion:

The model of comparative advantage in this problem set is similar to the model in the last problem set, except that the numbers for labor productivity in the two countries will be different. By "playing" this problem set over and over as practice, you will be able to explore all of the possible variations in absolute and comparative advantage for the two countries.

In the last problem set we considered the simple example of two countries, the U.S. and France, both of which can produce water and flags. There, the U.S. has an absolute advantage in producing both water and flags, and France had a comparative advantage in producing water.

That the U.S. had an *absolute* advantage in production of a good showed up in the graph (see the figure at the right) as that country having a larger intercept for its production possibilities curve on that good's axis. That France had a *comparative* advantage in the good on the horizontal axis showed up as that country's production possibilities curve being "flatter" than the curve for the U.S. Of course, when France had the comparative advantage in water, the U.S. had to have the comparative advantage in flags.



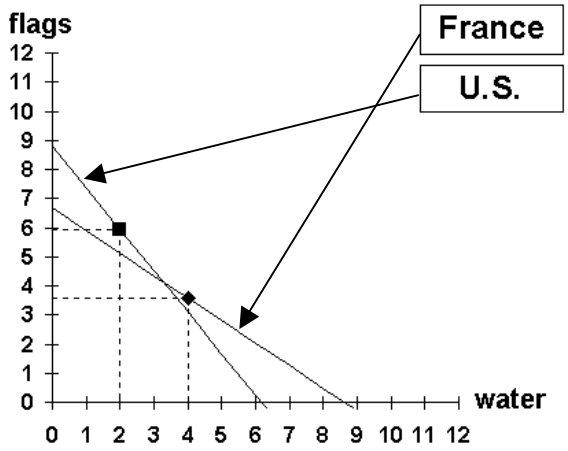
Consider now the randomly chosen labor productivities in the following table.

Output of one more worker

	WATER	FLAGS
U.S.	6.17	8.78
FRANCE	8.62	6.67

Here the absolute advantage in flag production belongs to the U.S. (8.78 versus 6.67 flags per worker), while the absolute advantage in water lies with France (8.62 versus 6.17 water per

worker. The production possibilities curves for the two countries are shown in the following table. Note that the curves in this case intersect.



The easiest way to explore comparative advantage is to look at the graph at the right. The country with the comparative advantage in water, the good on the horizontal axis, must be the one with the flatter production possibilities curve. In this case France has the comparative advantage in water. Therefore, the U.S. must have the comparative advantage in flags.

You can compute the opportunity cost of water directly from the table. In France the cost of one more water is (6.67/8.62), or about 0.77 flags. The U.S. cost of one more water is (8.78/6.17), or about 1.42 flags. So France, with the lower opportunity cost of water, has the comparative advantage in that good.

The theory of comparative advantage says that the country with the comparative advantage in a good will tend to specialize in the production of that good, and export whatever amount it doesn't want to consume in exchange for some of the other good. In this example, the theory suggests that France will specialize in the production of water, and the U.S. will specialize in the production of flags. France will export water to the U.S. in exchange for flags.

Answering the questions

In answering the questions in this problem set we will assume, as we did in the previous one, that the people of both France and the U.S. want to consume flags and water in equal proportions. One consequence of this is that, in some cases, specialization in production of a good will not be complete, and a country may end up producing a little bit of a good in which it doesn't have the comparative advantage. The hints below tell you how to handle cases like this.

Open the Excel file **compad298.xls**. If at the prompt you choose "Take test," you can enter your name and an ID number that will give you a randomly selected set of data that will be the same in subsequent "plays" so long as you enter the same ID number. If you choose "Practice" you will get a different randomly selected problem set each time you play. Using the second option will allow you to explore what happens in all possible cases of absolute and comparative advantage. We strongly recommend doing the second option several times to get a feel for how the model works, even if you answer only the first 12 questions as practice.

Hints and tips:

1) Keep your eye on the main point: A country will specialize in the good in which it has the comparative advantage. Specialization leads to larger world production of goods than if countries just produced and consumed in isolation.

2) For question 7 you can use Goal Seek to make (water – flags), the value in cell F24, equal to zero by changing the amount of water (cell D24).

3) For question 8 use Goal Seek again to make (water – flags), the value in cell F25, equal to zero by changing the amount of water (cell D25).

4) Questions 9 and 10 are key for understanding comparative advantage: The values asked for here are the total world production of the goods in the absence of trade. These are computed as the benchmark values against which you can measure the benefits of specialization and trade.

5) Question 11 requires some thought. If France has the comparative advantage in flags, then just enter 0 (zero) in cell D25. If she has the comparative advantage in water, enter the maximum amount of water she can produce, the amount in cell D17.

6) Question 12 presents the same difficulty. If the U.S. has the comparative advantage in flags, then just enter 0 (zero) in cell D24. If it has the comparative advantage in water, enter the maximum amount of water it can produce, the amount in cell D16.

If you have gotten to this point, you can grasp the importance of the exercise, which is that total production of both goods has gone up as a result of specialization.

7) After you answer question 12 (but before you answer question 13) notice that the total number of flags produced may not equal the number units of water produced. This shows up as cell F26 being non-zero. So with the current production levels it's not possible to meet our requirement that equal amounts of the goods are consumed. You can use Goal Seek to fix this problem. Here's how to proceed.

A) If France has the comparative advantage in water, *and* cell F26 is greater than zero, do Option 1 below.
B) If France has the comparative advantage in water, *and* cell F26 is less than zero, do Option 2 below.

C) If the U.S. has the comparative advantage in water, *and* cell F26 is greater than zero, do Option 2 below.
D) If the U.S. has the comparative advantage in water, *and* cell F26 is less than zero, do Option 1 below.

Option 1: Use Goal Seek to set cell F26 to zero by changing cell D25.
Option 2: Use Goal Seek to set cell F26 to zero by changing cell D24.

This complication is an artifact of our assumption that consumption of the two goods is equal. It's not very important to the economics. What is important for the economics is that specialization and trade will increase the total amount of goods produced in the world.

MATH MAVEN'S CORNER: Here's a table showing productivities for labor in France and the U.S.

Output of one more worker

	WATER	FLAGS
U.S.	*A*	*B*
FRANCE	*C*	*D*

The equation of the U.S. production possibilities curve is $F = B - (B/A)W$, where F and W are the amounts of flags and water produced, respectively. A is the U.S. water productivity, and B is the U.S. flag productivity. For France, the curve is $F = D - (D/C)W$, where D is the flag productivity and C is the water productivity.

The U.S. has the absolute advantage in water if $A>C$, and the absolute advantage in flags if $B>C$. The opportunity cost of water in the U.S. is B/A, and the opportunity cost of water in France is D/C. The U.S. has the comparative advantage in water if $(B/A)<(D/C)$.

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.

MORE COMPARATIVE ADVANTAGE

Questions

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 she has a comparative advantage, how much water will she produce? (Be sure this value is entered in cell D25 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 cell D24 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: Be sure to check out the hints and tips section of the write up.]

14. What level of French water production would allow both specialization and equal water and flag consumption in the world? [Hint: Be sure to check out the hints and tips section of the write up.]

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

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

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

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