Public Affairs 856
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University of Wisconsin-Madison

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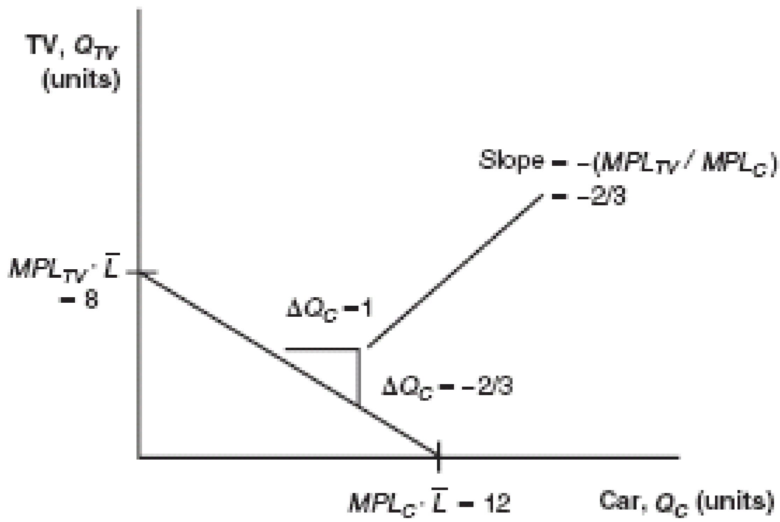
Problem Set 1 Answers

Due in Lecture on ***Wednesday, February 16th, in lecture***.

1. . Suppose that each worker in the home country can produce three cars or two televisions. Assume that Home has four workers.

   a. Graph the production possibilities frontier for the home country.

   Answer: See the following figure.



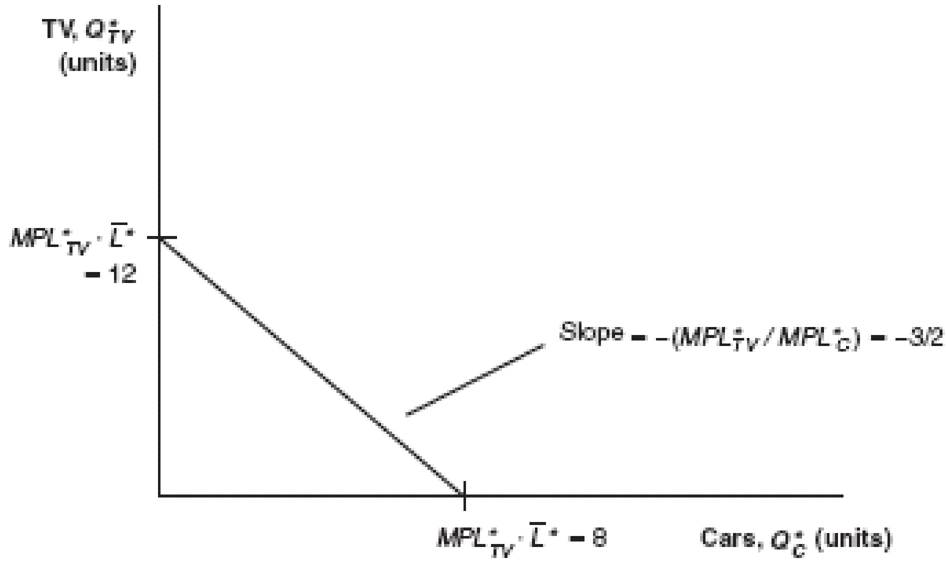
   b. What is the no-trade relative price of cars at Home?

   Answer: The no-trade relative price of cars at Home is $P_C / P_{TV} = 2/3$.

2. Suppose that each worker in the foreign country can produce two cars or three televisions. Assume that Foreign also has four workers.

a. Graph the production possibilities frontier for the foreign country.

Answer: See following figure.



b. What is the no-trade relative price of cars in Foreign?

Answer: The no-trade relative price of cars in Foreign is $P^*_C / P^*_{TV} = 3/2$.

c. Using the information provided in problem 2 regarding Home, in which good does Foreign have a comparative advantage and why?

Answer: Foreign has a comparative advantage in producing televisions because it has a lower opportunity cost than Home in the production of televisions.

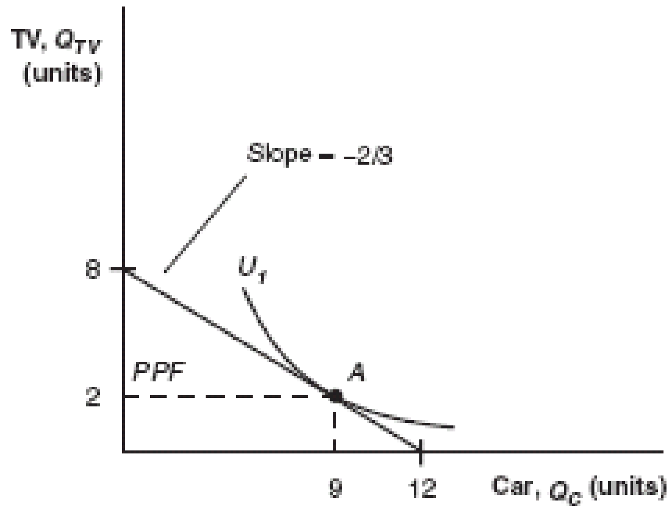
3. Now suppose the world relative price of cars is $P_C / P_{TV} = 1$.

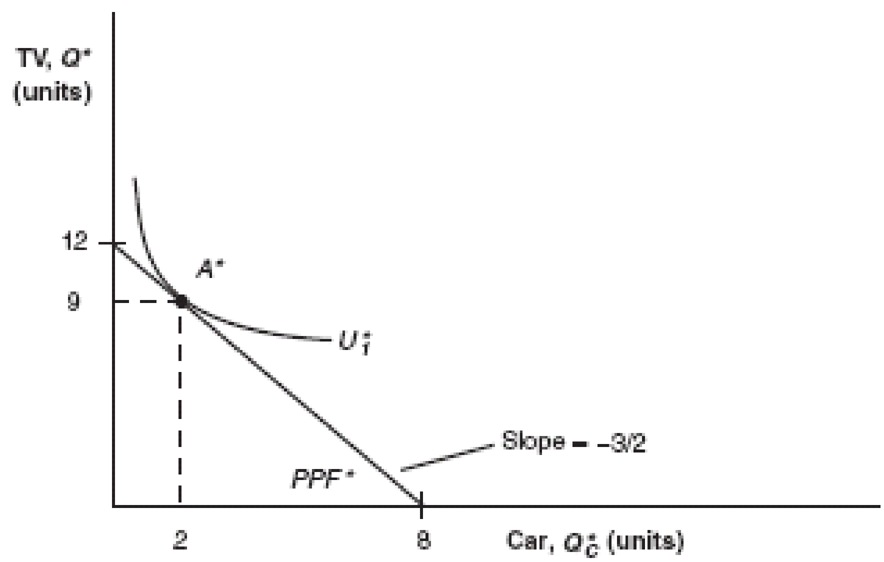
a. What good will each country specialize in? Briefly explain why.

Answer: Home would specialize in cars, export cars, and import televisions, whereas the foreign country would specialize in televisions, export televisions, and import cars. The reason is because Home has a comparative advantage in cars and Foreign has a comparative advantage in televisions.

4. Suppose that in the absence of trade, Home consumes nine cars and two televisions and Foreign consumes two cars and nine televisions. Add the indifference curve for each country to the figures in problems 2 and 3. Label the production possibilities frontier (PPF), the indifference curve (U_1), and the no-trade equilibrium consumption and production for each country. Label Home and Foreign's no-trade consumption points as A and A^*, respectively.

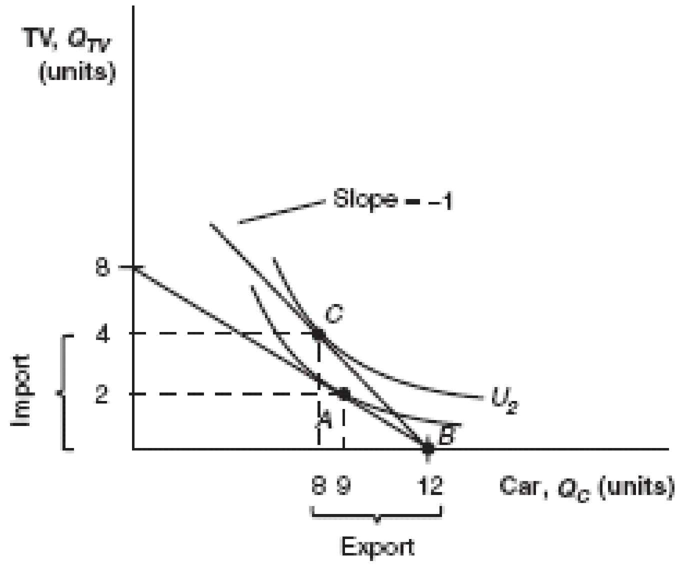
Answer: See following figures.

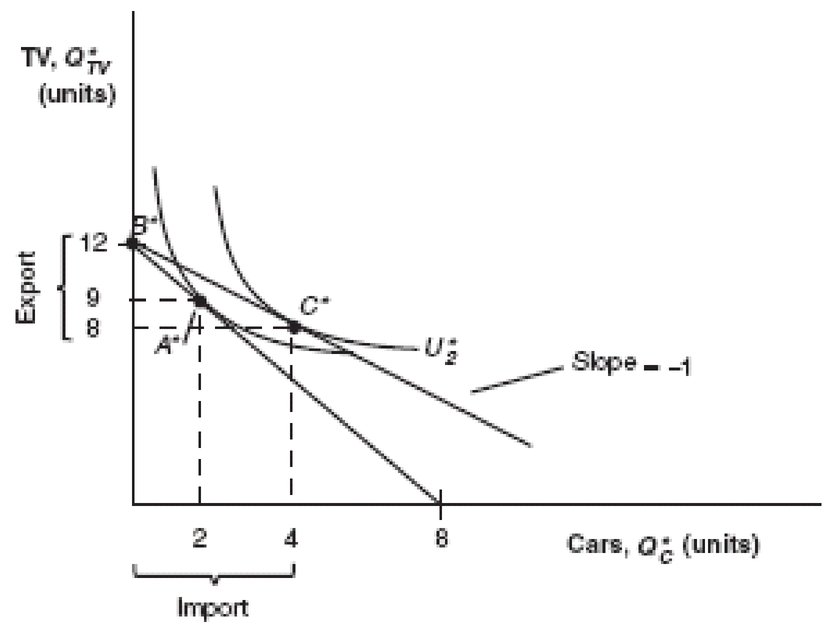




b. Graph the new **world price line** for each country in the figures in problem 4 on page S-7, and add a new indifference curve (U_2) for each country in the trade equilibrium.

Answer: See the following figures.





c. Label the exports and imports for each country. How does the amount of Home exports compare with Foreign imports?

Answer: See graph in part (b). The amount of Home exports of cars is equal to the amount of Foreign car imports. In addition, Home imports of televisions equal Foreign exports of televisions.

d. Does each country gain from trade? Briefly explain why or why not.

Answer: Both Home and Foreign benefit from trade relative to their no-trade consumption because they are able to consume at higher indifference curves.

5. Answer the following question using the information given by the accompanying table.

	Home Country	Foreign Country	Absolute Advantage
Number of bicycles produced per hour	4	2	***Home/Foreign ratio*** 2
Number of snowboards produced per hour	6	8	***Home/Foreign ratio*** 3/4
Comparative advantage	$\frac{MPL_S}{MPL_B} = \frac{3}{2}$	$\frac{MPL_S^*}{MPL_B^*} = 4$	

a. Complete the previous table in the same manner as Table 2-2.

Answer: See previous table.

b. Which country has an absolute advantage in the production of bicycles? Which country has an absolute advantage in the production of snowboards?

Answer: Home has an absolute advantage in the production of bicycles because it is able to produce more bicycles in an hour than Foreign.

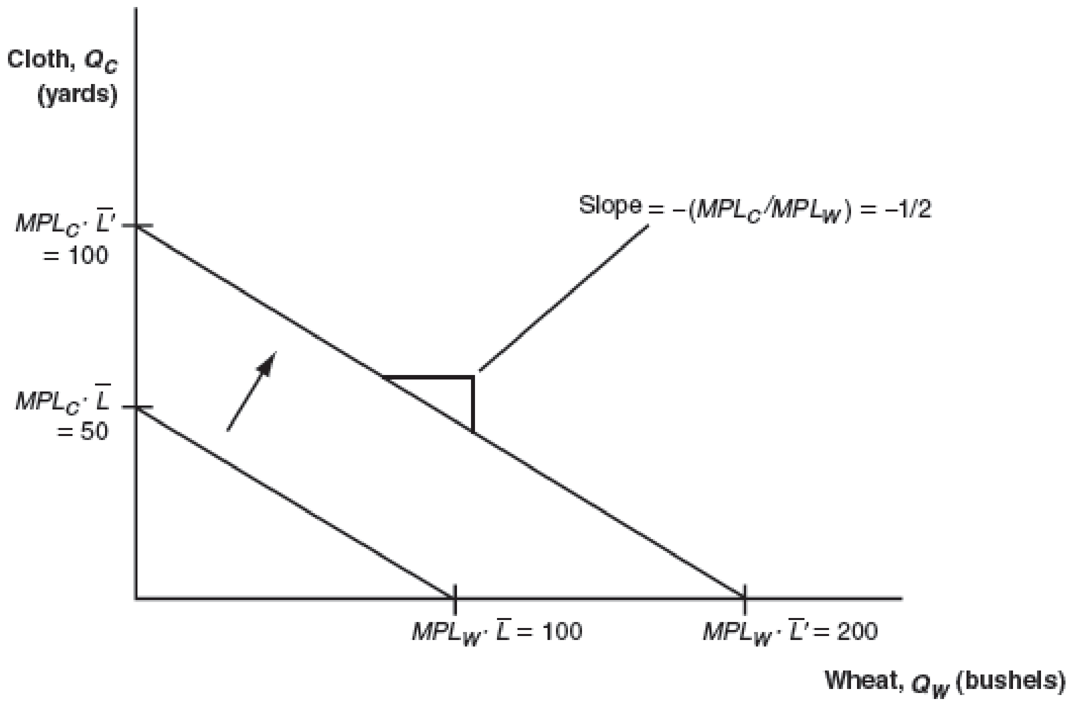
c. What is the opportunity cost of bicycles in terms of snowboards at Home? What is the opportunity cost of bicycles in terms of snowboards in Foreign?

Answer: Foreign has an absolute advantage in the production of snowboards because it is able to produce more snowboards in an hour than Home.

d. Which product will Home export, and which product does Foreign export? Briefly explain why.

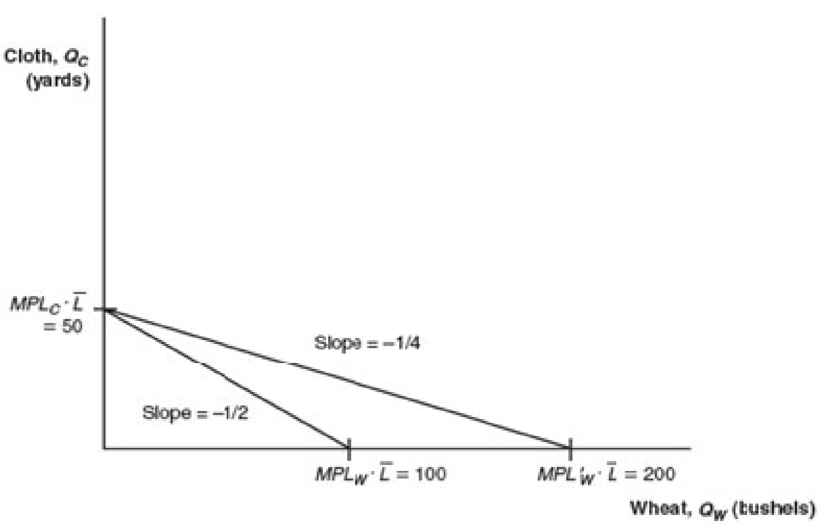
Answer: The opportunity cost of one bicycle is 3/2 snowboards at Home ($P_B/P_S = MPL_S/MPL_B = 6/4 = 3/2$). The opportunity cost of one bicycle is 8/2 snowboards in the foreign country ($P_B^*/P_S^* = MPL_S^*/MPL_B^* = 8/2 = 4$). Home has a smaller opportunity cost producing bicycles than the Foreign.

6. a. Suppose that the number of workers doubles in Home. What happens to the Home PPF, and what happens to the no-trade relative price of wheat?



Answer: With the doubling of the number of workers in Home, it can now produce $200 = 4 \cdot 50$ bushels of wheat if it concentrates all resources in the production of wheat, or it could produce $100 = 2 \cdot 50$ yards of cloth by devoting all resources to the production of cloth. The PPF shifts out for both wheat and cloth. The no-trade relative price of wheat remains the same because both MPL_W and MPL_C are unchanged.

b. Suppose that there is technological progress in the wheat industry such that Home can produce more wheat with the same amount of labor.What happens to the Home PPF, and what happens to the relative price of wheat? Describe what would happen if a similar change occurred in the cloth industry



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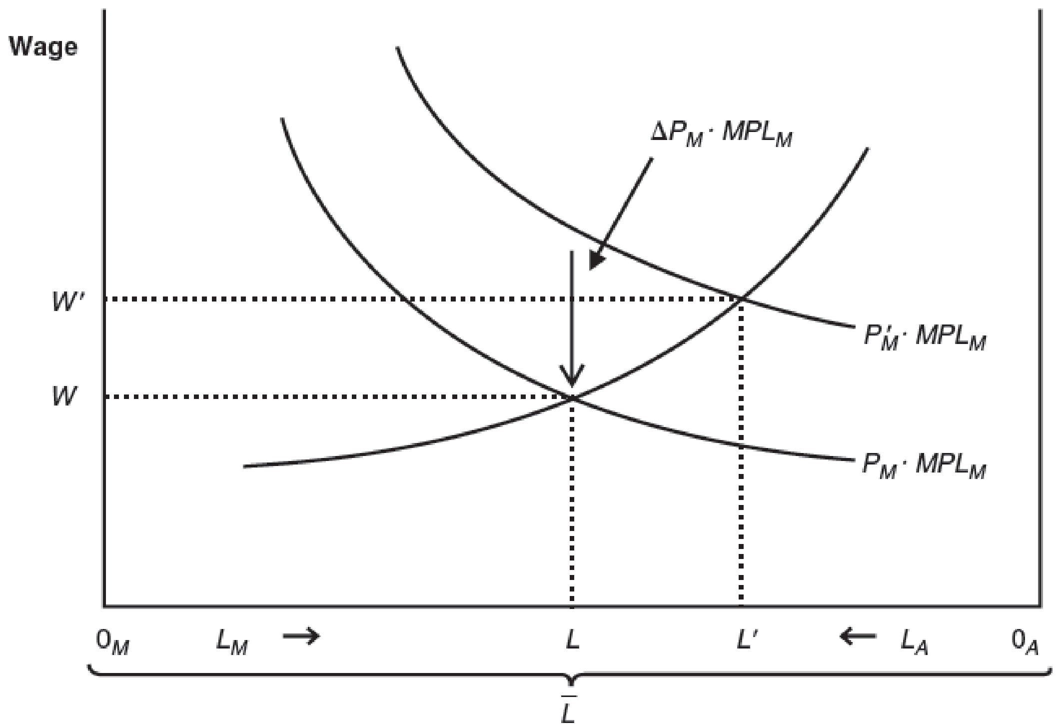
Answer: Because the technological progress is only in the wheat industry, Home's production of cloth remains the same if it devotes all of its resources to producing cloth. If instead Home produces only wheat, it is able to produce more wheat using the same amount of labor. Home's PPF shifts out in the direction of wheat production. Recall that the relative price of wheat is given by $P_W / P_C = MPL_C / MPL_W$. With the technological progress in wheat, the marginal product of labor in the wheat production increases. Thus, the relative price of wheat decreases. As shown in the graph, the relative price of wheat drops from 1/2 to 1/4.

If instead the technological progress is in the cloth industry, we would have the opposite results. Home's PPF would shift out in the direction of cloth production and the relative price of wheat would increase.

7. Starting from equilibrium in the specific-factors model, suppose the price of manufactured goods falls so that wages fall from W' to W in Figure 3-5.

   a. Show that the percentage fall in the wage is less than the percentage fall in the price of manufacturing, so that the real wage of labor in terms of manufactured goods goes up.

   Answer:



As seen in the diagram, both the price of manufactured goods and the wages decrease. The key to this exercise is to realize that the vertical distance of the decrease in wage is less than the vertical distance of $\Delta P_M \cdot MPL_M$. Therefore:

$$\Delta P_M \cdot MPL_M > \Delta W$$

where ΔW represents the change in wage. Dividing both sides by the initial wage ($W' = P'_M \cdot MPL_M$):

$$\Delta P_M \;/\; P'_M > \Delta W \;/\; W'$$

This is the desired result: the percentage fall in the wage is less than the percentage fall in the price of manufacturing, so that the real wage of labor in terms of manufactured goods goes up.

b. What happens to the real wage of labor in terms of agriculture?

Answer: Because the wage decreases and the price of agricultural goods remains the same, the amount of agricultural goods that can be bought by labor decreases. That is, real wage decreases in terms of agriculture.

c. Are workers better off, worse off, or is the outcome ambiguous?

Answer: Because the real wage increases with respect to manufactured goods and decreases with respect to agriculture, the outcome will be ambiguous for workers. For some, who prefer to purchase a lot of agriculture, the price change means an overall loss in terms of how much they can buy. Others, who prefer to buy mainly manufactured goods, gain in terms of how much they can buy.

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