

## Key to Second In-class Exercise: Comparative Advantage

	Home	Foreign*	Possible production		Relative Productivity
			Home	Foreign	
Labor (hours / year)	L=600	L*=1500	$L O_{LS}$	$L^* O^*_{LS}$	$O_{LS}/O^*_{LS}$
Shoes (pair S / hour)	$O_{LS}=10$	$O^*_{LS}=2$	6000 S/yr	3000 S/yr	<b>5</b>
			$L O_{LT}$	$L^* O^*_{LT}$	$O_{LT}/O^*_{LT}$
Tea (bushel T / hour)	$O_{LT}=5$	$O^*_{LT}=4$	3000 T/yr	6000 T/yr	<b>1.25</b>
Opportunity costs					
Tea					
$O_{LS}/O_{LT}$ (pair S / bushel T)	2	0.50	Foreign has a lower opp. cost of T.		
Shoes					
$O_{LT}/O_{LS}$ (bushel T / pair S)	<b>0.5</b>	2	Home has a lower opp. cost of S.		

1. Use the Ricardian model of international trade to answer the following questions. The table above shows the labor productivity of each country in each industry as its output per hour of labor.
- a. If Home produces both goods in autarkic equilibrium (no trade), then what relative price of S must prevail? Hint: workers will not want to produce a good unless its price is greater than or equal to its opportunity cost.

Home's workers will not produce a good unless they can earn their opportunity cost. Thus  $P_S/P_T \geq O_{LT}/O_{LS} = 0.5$  (bu./pr.) and  $P_T/P_S \geq O_{LS}/O_{LT} = 2$  (pr./bu.). The only relative price that makes both of these statements true is  $P_S/P_T = 0.5$  (bu./pr.).

- b. Which country has comparative advantage in which good and why?

Foreign has a comparative advantage in T because their opportunity cost (and "autarky" relative price,  $P_T/P_S$ ) is lower than Home's opportunity cost.

Home has a comparative advantage in S because their opportunity cost (and autarky relative price,  $P_S/P_T$ ) is lower than Foreign's opportunity cost.

- c. Turn your paper over and graph one possible international trade equilibrium. Assume that the countries agree to trade at a relative price of S in the middle of the range of their opportunity costs. (Hint: use the possible production values you may have calculated while completing the table above.)

Foreign's autarky relative price, ( $P_S/P_T$ ) is 1/2 bushel of T per pair of S, while Home's opportunity cost ( $P_S/P_T$ ) is 1/3 bushel of T per pair of S. If trade is to benefit both countries, then  $0.5 < P_S/P_T < 2$ .

The middle of this range suggests  $P_S/P_T = 1.25$  (bushel/pair).

Each country produces only its comparative advantage good, and trades to get the other good.

One possible trade: Home exports 1000 (pair S/year) and imports 1250 (bushel T/year). Foreign imports 1000 (pair S/year) and exports 1250 (bushel T/year). Try graphing that.



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- d. How will Home's wage rate compare to the wage rate in Foreign? (Hint: use the relative productivity values that you may have calculated while completing the table.)

Home's workers are more productive. Therefore, they will earn a higher wage than Foreign's workers. The limits on the relative wage are  $1.25W^* < W < 5W^*$ , where  $W$  is the wage in Home and  $W^*$  is the wage in Foreign. That is, Home's wage must be between 1.25 and 5 times the wage in Foreign, because Home is 5 times as productive in S and 1.25 times as productive in T.

These limits may be determined by comparing the costs of each good across countries. We know that Foreign has a comparative advantage in T. In the long run, goods will be produced where they are less expensive to produce. This implies that  $W/O_{LT} > W^*/O_{LT}^*$ . Rearrange this to show  $W/W^* > O_{LT}/O_{LT}^* = 5/4 = 1.25$

Home's comparative advantage in S implies that  $W/O_{LS} < W^*/O_{LS}^*$ . Rearrange this to show  $W/W^* > O_{LS}/O_{LS}^* = 10/2 = 5$ .

It is also acceptable to answer this question with a numerical example. Given  $P_s/P_t = 5/4$  (bushel/pair), then it follows that  $w/w^* = 3.125$

Why? Home's workers produce S, and earn what they produce:  $O_{LS} = 10$  (pr./hr.). Foreign's workers produce T, and earn what they produce:  $O_{LT}^* = 4$  (bu./hr.). Home's workers can trade their S for T at the  $P_s/P_t = 5/4$  (bu./pr.). Thus, in terms of T, Home's wage is  $50/4 = 12.5$  (bu./hr.) – found as  $10(\text{pr./hr.})$  times  $(5/4)$  (bu./pr.).

Next compute the relative wage, say  $w/w^* = 12.5/4 = 25/8 = 3.125$

Note that 3.125 is within the limits on the relative wage found in the first paragraph of this answer.