

Experiment 1

Solutions prepared by Shijun Ju

September 22, 2009

Bundle	Red	White
A	4	11
B	7	8
C	5	12

1. Calculate the exchange rate for each of your trades (p_R/p_W). That is, starting at the initial bundle what was the rate of exchange of white chips for one more red chip?

The exchange rate $-\frac{p_R}{p_W} = \frac{\Delta x_W}{\Delta x_R}$ between A and B is $\frac{8-11}{7-4} = -1$; the exchange rate $-\frac{p_R}{p_W}$ between B and C is $\frac{12-8}{5-7} = -2$. Thus the exchange rate when moving from A to B corresponds to giving up one white for one red and when moving from B to C giving up 2 whites for one red.

2. Calculate the $MRS_{R,W}$ for the Cobb-Douglas Utility function $U = x_R \times x_W$

According to definition of MRS, $MRS_{R,W} = -\frac{MU_R}{MU_W}$.

At (x_R, x_W) , the marginal utility for an extra red chip (white chip) is the partial derivative of U with respect to x_R , i.e. $\frac{dU}{dx_R} = x_W$ (the partial derivative of U with respect to x_W , i.e. $\frac{dU}{dx_W} = x_R$).

Therefore, $MRS_{R,W} = -\frac{MU_R}{MU_W} = -\frac{x_W}{x_R}$.

3. Calculate the $MRS_{R,W}$ at each of the bundles that you had.

According to Question 2, at A, $MRS_{R,W} = -\frac{11}{4}$; at B, $MRS_{R,W} = -\frac{8}{7}$; at C, $MRS_{R,W} = -\frac{12}{5}$.

4. Did any of your trades increase your utility? Pick one of those trades. Did you increase the number of white or red chips in this trade? Compare the $MRS_{R,W}$ and the $-p_R/p_W$ at the bundle prior to your trade and explain why this trade made you better off.

The utility levels at A, B and C are 44 (4×11), 56 (7×8) and 60 (5×12), respectively. Hence, both trades increased utility.

Trade A→B increases red chips and decreases the white chips. Looking at A we see that the $MRS_{R,W} = -\frac{11}{4}$, that is you were willing to give up 11/4 white chips for another red chip. Looking at the exchange rate for the trade, $-\frac{p_R}{p_W} = \frac{\Delta x_W}{\Delta x_R} = -1$, we see that the market only required that you give up one white chip for a red chip. Thus the units of white chips required for an additional red chip (1) were much smaller than the units of whites you were willing to give up (11/4). Thus you benefitted from increasing the number of reds and decreasing the number of whites.

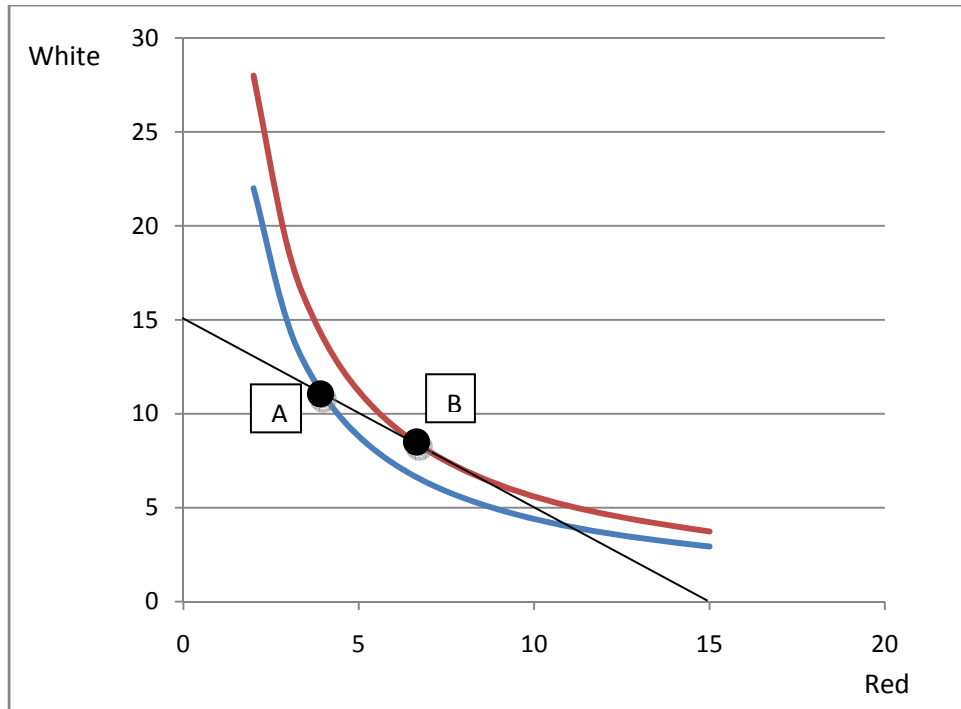
Trade B→C increases white chips at the expense of red chips. Looking at B we see that the $MRS_{R,W} = -\frac{8}{7}$, that is you were willing to give up 8/7 white chips for another red chip. Looking at the exchange rate for the trade, $-\frac{p_R}{p_W} = \frac{\Delta x_W}{\Delta x_R} = -2$, we see that the market required that you give up two white chips for a red chip. Thus the units of white chips required for an additional red chip (2) were much greater than the units of whites you were willing to give up (8/7). Thus it would be a poor idea to increase the red chips. Instead you benefitted from increasing the white chips and decreasing the red. This trade improved your utility because the units of red chips required for an additional white chip (1/2) were much smaller than the units of whites you were willing to give up (7/8).

To summarize if $MRS_{R,W} > -\frac{p_R}{p_W}$, you are willing to pay less than the market requires for a red chip, hence you should exchange red for white chips; if $MRS_{R,W} < -\frac{p_R}{p_W}$, you are willing to pay more for a red chip than the market requires hence you should exchange white for red chips.

5. *Should you increase or decrease the number of white chips when $MRS_{R,W}$ is greater than $-\frac{p_R}{p_W}$?*

One should increase the number of white chips when $MRS_{R,W} > -\frac{p_R}{p_W}$. The reason is that the number of white chips you would have to give up for another red chip (i.e. $\frac{p_R}{p_W}$) is higher than what you are willing to give up. Hence you should decrease the number of red chips and increase the number of white ones.

6. *Draw a graph indicating your initial and second consumption bundle. Denote the initial bundle A and the second bundle B. Draw the relevant indifference curves through bundles A and B.*



7. Draw a budget line through bundle A with a slope identical to your first exchange rate.
8. Given the exchange rate and your $MRS_{R,W}$ were you maximizing your utility at point B? Why or why not?

Yes, given the exchange rate I was maximizing utility at point B. At a relative price of -1, I could not increase my utility past 56. This can also be seen by the fact that the $MRS_{R,W}$ of -8/7 practically is equal to the relative prices of -1. If poker chips were divisible I would have maximized my utility at the bundle (7.5, 7.5)