Econ 361: Intermediate Microeconomics
Prof. Sarah West

Homework 2
30 points
Spring 2012

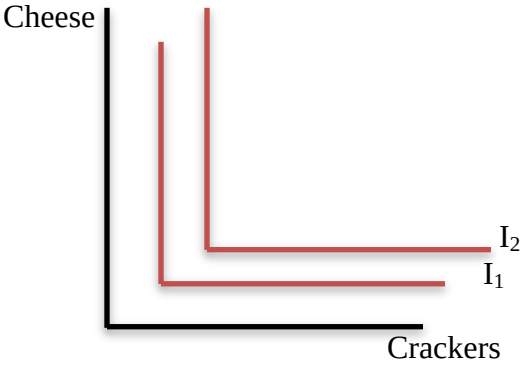
1. (4 points) If for a consumer $\frac{MU_x}{MU_y} > \frac{p_x}{p_y}$, can she increase utility by buying more of good *x* and less of good *y*? Explain.

Generally, one's utility is maximized when $\frac{MU_x}{MU_y} = \frac{P_x}{P_y}$. Currently, the per dollar MU for X is larger than that of Y. Thus, increase x and reduce y will equalize $\frac{MU_x}{P_x}$ and $\frac{MU_y}{P_y}$, and will reach the utility maximization point.

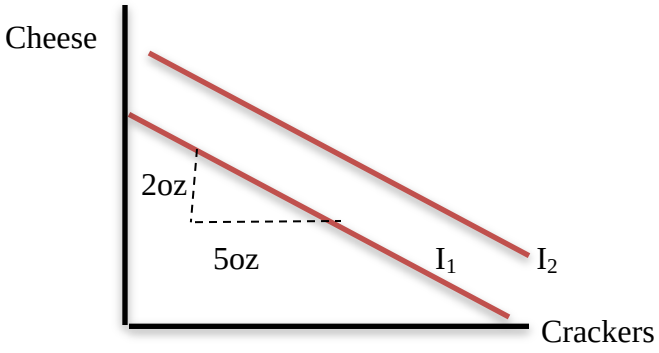
However, if X and Y are perfect substitutes, the above equation is true at all points. Her solution will be a corner solution where she consumes all X and no Y. In this case, she cannot increase utility by buying more X.

2. (4 points) Draw a set of indifference curves associated with each statement. Treat each subquestion as an entirely different question. Jack consumes only two goods: cheese and crackers.

a. If Jack eats more cheese but gets no more crackers, his utility does not change.

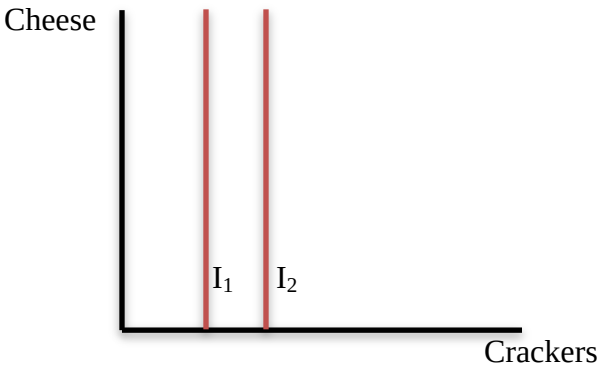


b. Jack is willing to give up 2 ounces of cheese in exchange for 5 crackers.



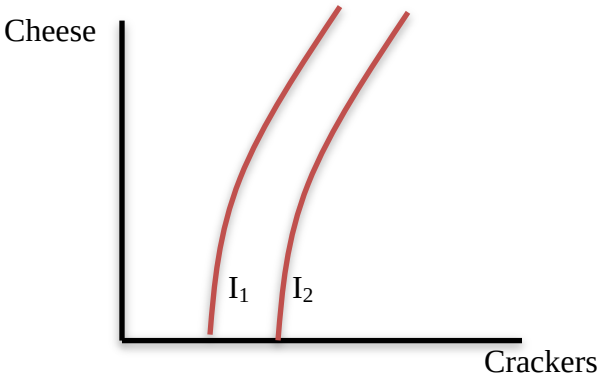
A graph with convex indifference curves would also work here, as long as you indicate at which point the tradeoff is 2 for 5.

c. Jack dislikes cheese and likes crackers. If you give him cheese, he will throw it away.



If we interpret "throwing it away" to mean it has no effect on his utility, then utility is no longer a function of cheese. Increasing crackers shifts him to a higher indifference curve, but changing the quantity of cheese has no effect (as he throws it away).

d. Jack dislikes cheese and likes crackers. If you give him cheese, he will eat it to be polite.



If we interpret "eating it to be polite" to mean he will eat it but it will cause him disutility, then we model cheese as a "bad". In order to get him to eat more cheese (the bad), we must "bribe" him with more crackers to hold his utility constant. Visually, this would move him up a given indifference curve.. Increasing only cheese decreases utility and moves him to a lower indifference curve, while increasing crackers does just the opposite.

These interpretations of c and d could potentially be switched, and thus the indifference curves would switch as a result. The key to these questions is to come up with an interpretation and draw curves consistent with that interpretation.

3. (4 points) Is a good its own complement or its own substitute? Explain.

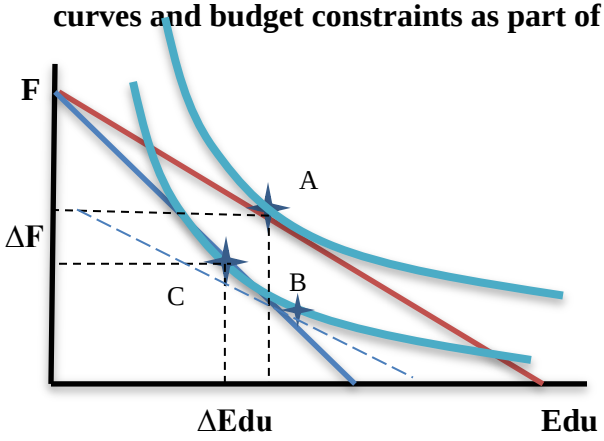
Complements, when the price of one good rises, the demand for the other good falls.
Substitutes: when the price of one good rises, the demand for the other good rises.

For one good to be complement of its own, when the price of the good rises, the quantity demanded needs to fall. Thus, for normal good and inferior goods (exc. Giffen Good), it is its own complement.

If an individual good is a Giffen Good, however, as price rises, the quantity demanded rises. In this case, it is its own substitute.

4. (6 points) Because it is often costly for young children in developing countries to go to school (because the opportunity costs of doing so are high, transportation is difficult, or fees are charged by schools), a commonly suggested development strategy is to subsidize children's consumption of education by instituting policies that reduce its price. You are asked to evaluate this idea, taking into account the possible effects of the subsidy on education and on food consumption.

a. Under what conditions would the reduction in the price of education increase the amount of education "consumed" by a child? Use a graph with indifference curves and budget constraints as part of your answer and explain in words.

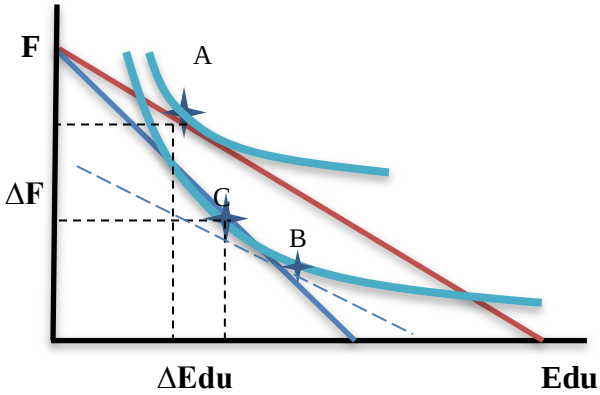


Originally, a child consume at point C. As price of education decreases, the budget constraint shifts out. C to B illustrates the substitution effect. A child consumes more education, as it is now relatively cheaper than before; and less food. However, the income effect (B to A) will reduce the consumption of education and increase food. ΔEdu from C to A is positive. The reduction in the price of education increase the amount of education consumed by a child in this case.

That is, even if education is an inferior good (which it is not, in the real world), education will increase as long as it is not a Giffen good. That is, as long as the substitution effect is larger in magnitude than the income effect, even if education is inferior, consumption of it will increase as the price decreases.

You could have also answered this question showing both education and food as normal goods.

b. Under what conditions would the reduction in the price of education *decrease* the amount of education "consumed" by a child? Use a graph with indifference curves and budget constraints as part of your answer. Are these conditions likely to hold? Explain.



Apply the same logic in part a, C to B shows the substitution effect, which increases the education, consumed. But income effect is negative and very large in magnitude here and it moved B to A. At point A, the education amount is smaller than that of C. Thus, the reduction in education in this case decreases amount of education consumed.

That is, in this graph, education is an inferior good AND the magnitude of the negative income effect is larger than the magnitude of the substitution effect. Education is a Giffen good here.

As explained in the article by Jensen and Nolan, Giffen behavior is more likely to occur when (1) The good is an inferior good (2) Spending on the good takes up a large proportion of total spending (3) and the good has no ready substitute. While the third condition may hold for education, the first two do not.

c. What would we expect to happen to a child's food consumption in the present period as a result of the subsidy to education?

The answer depends on whether food and education are complements or substitutes. If the two goods are complements, then a decrease in the price of education will increase food consumption. If they are substitutes, then a decrease in the price of education will decrease food consumption.

5. (6 points) Josh likes Sprites (*s)* and enchiladas (*e)* (He likes enchiladas verdes the best). A Sprite costs him $1.50, and an enchilada costs him $2.50. His income is $600.00.

a. If Josh's utility is given by *U = s + 3e,* how many Sprites and how many tacos will he consume?

Calculate the absolute values of the slopes of the budget constraint and the slope of the indifference curve:

$P_e/P_s = 2.5/1.5 = 5/3$

$MU_e/MU_s = \partial U/\partial e/\partial U/\partial s = 3$

The marginal rate of substitution is constant. A corner solution is very likely, as these goods are perfect substitutes.

And indeed, because $MU_e/MU_s > P_e/P_s$, we have a corner solution (What if the slopes are the same? Think about it). This condition says that the slope of the indifference curve is always steeper than the budget constraint (putting enchiladas on the x-axis).

He will spend all of his money on enchiladas and none of it on Sprites. An intuitive way to look at this is to look at the marginal utilities per dollar. MUe/Pe = 3/2.5 = 6/5 and

MUs/Ps = 1/1.5 = 2/3. The marginal utility per dollar of enchiladas is 1.2, while for Sprites it is only 2/3, so he spends his entire budget on enchiladas and buys 240.

b. If Josh's utility is instead given by U = min (s, $3e$), how many Cokes and how many tacos will he consume?

Josh's utility function now describes the two goods as perfect complements.

He will always consume in a ratio of 1/3 enchiladas for every sprite, because otherwise he is wasting either of the two goods. We can write this as s = 3e; he consumes 3 times as many Sprites as enchiladas.

Therefore, using this to substitute 3e for s in his budget constraints, we get (3e)*1.5 + e*2.5 = 600, and thus e = 600/7; s = 1800/7

c. Finally, if Josh's utility is instead given by $U = s^{1/3}e^{2/3}$, how many Sprites and how many enchiladas will he consume?

Find the MRSe,s and set it equal to the price ratio:

dU/de = (2/3)*s^(1/3)*e^(-1/3)
dU/dS = (1/3)*s^(-2/3)*e^(2/3)

MRS = (dU/de)/(dU//ds) = 2s/e = Pe/Ps = 2.5/1.5

2.5e = 3s

So e = 1.2s

Solve for s using the budget constraint:

600 = s*1.5 + (1.2s)*2.5

600 = 1.5s + 3s

600 = 4.5s

s = 133.33 and e = 160

6. (6 points) The Obama administration claims that moving to a price index calculated with more frequently-adjusted quantities will save the federal government money without making anyone worse off than they are now. Interpret, and use a graph as part of your interpretation.

The Laspeyres CPI price index = (current prices * base year quantities)/(base prices * base year quantities). It uses the same bundle of goods to evaluate price change. The shortcoming is that it may over estimate inflation without consideration of the degree to which consumers substitute away from relatively more expensive goods toward cheaper ones. To the extent that the CPI used by the government (and many firms) does not often adjust quantities to reflect such substitution it operates more like a Laspeyres price index than an ideal price index (within spending category it does, but not across spending catagories…if the relative price of apples increases, a household is assumed to buy cheaper apples within the apple category, but to buy the same number of apples, not reduce apple consumption and increase pear consumption).

If the government uses an index that accounts more frequently for adjustments in quantities, it would use an index that allows for a greater degree of substitution across categories of goods. This is a move toward an ideal price index, away from a Laspeyres price index.

A complete answer to this problem would include a graph that showed the difference between the Laspeyres price index and an ideal price index, and an accompanying explanation of how the graph relates to the Obama administration's proposal.