

Math Recitation #2 – September 29, 2009

I. Utility functions

Describes the 'utility' a good gives a certain individual. The function can include many goods that contribute to utility to different degrees.

$$U(x,y)=x + y \quad U(x,y)= xy \quad U(x,y)=5\ln x + 7\ln y$$

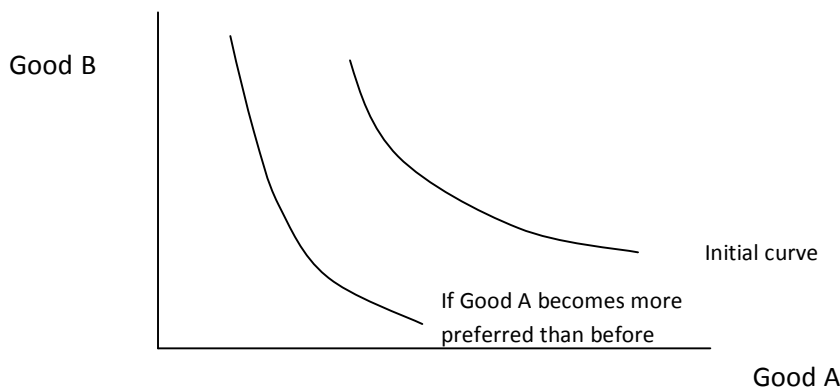
II. Indifference curves

If you plot all the possible combinations of two goods that result in the same level of utility, you have created an indifference curves.

- Indifference curves are always downward sloping. As you decrease the amount of one good consumed, to compensate and stay at the same utility level you must increase the amount of the other good consumed
- As you move away from the origin, indifference curves indicate higher values of utility. An individual will always prefer a higher level of utility and more of something is always better than less.
- Shows diminishing marginal utility → as you increase the number of units of one good, the additional marginal utility you gain from an extra unit decreases.

III. Changes in the shape of the indifference curve

If an individual's utility function changes because their preferences change, they begin to prefer one or both of the goods more or less, the shape of the indifference curves will change.



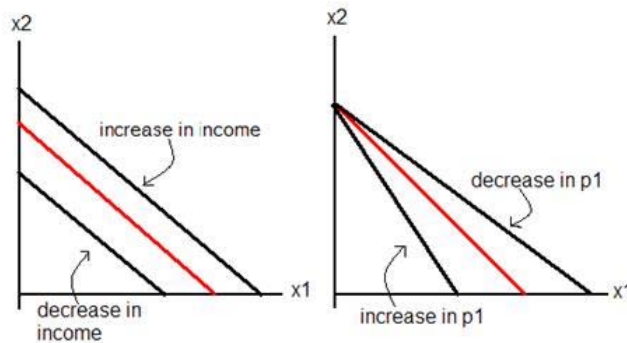
IV. Budget constraints

The budget constraint describes all possible combinations of the two goods that can be bought if all of one's income is used. It is a downward sloping line with a slope equal to the ratio of the prices of the two goods.

$$\text{Income} = P_x X + P_y Y$$

V. Changes in budget constraints

- 1) If the individual gains more overall income, the budget constraint will shift out uniformly because at the same prices, the individual can buy more of each good. They are able to reach a higher level of utility now as well.
- 2) If there is a relative price change of one of the goods, the budget constraint will pivot out or in but will remain at the same intercept on the axis of the good whose price is unchanged. If the price decreases the budget line will pivot out because you can buy more of that good if you buy the same amount of the other good than before. The line pivots in if the price increases.



VI. Maximizing utility subject to budget constraint

Step 1: Figure out marginal utilities of each of your goods respectively, which is the partial derivative of the utility function for each good

$$MU_x = dU(x,y)/dx \text{ and } MU_y = dU(x,y)/dy$$

Step 2: Figure out the Marginal Rate of Substitution, which is the ratio of the marginal utility of good x and good y

$$MU_x/MU_y$$

Step 3: Figure out slope of budget line, which is the ratio of the price of good x and good y

$$P_x/P_y$$

Step 4: Set the MRS equal to the ratio of prices

$$MU_x/MU_y = P_x/P_y$$

Step 5: Solve for the amount of good x in terms of y or good y in terms of x (whichever is computationally easier)

Step 6: Plug the value of good x in terms of y into budget constraint and solve for y

Step 7: Plug value of y into your expression of good x in terms of good y to solve for x

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