PRACTICE 2 - MICROECONOMICS

Bachelor Degree in Global Governance

Erminia Florio

erminia.florio@uniroma2.it

UTILITY MAXIMIZATION: INDIFFERENCE CURVES

- To be able to solve the utility maximization problem, it is necessary to review some preliminary concepts such as indifference curves.
- An indifference curve is a set of points on the diagram $(x_1; x_2)$ representing the baskets of goods 1 and 2 associated at the same utility level by the utility function. Mathematically speaking, the indifference curves are the contour lines of the utility function.
- To be able to draw them on a Cartesian diagram easily, it is important to know how to explicate the utility function as x_2 as a function of x_1 (in the form $x_2 = f(x_1)$), after setting a utility level Ū.

UTILITY MAXIMIZATION: INDIFFERENCE CURVES

- The slope of an indifference curve is the opposite of the modulus of the ratio of marginal utilities, and the ratio of marginal utilities is the marginal essay of substitution:

$$\mathrm{MRS}_{1,2} = \frac{MU_1}{MU_2} = \frac{\frac{\partial U(x_1,x_2)}{\partial x_1}}{\frac{\partial U(x_1,x_2)}{\partial x_2}}$$

- The slope is therefore: $-|MRS_{1,2}|$
- **Exercise:** Given the following utility function : $U(x_1, x_2) = x_1^{\frac{1}{4}} x_2^{\frac{1}{2}}$, find
  i. the equation of a generic indifference curve,
  ii. the equation of the indifference curve relative to the utility level Ū = 3,
  iii. the slope of the indifference curves.

THE BUDGET CONSTRAINT

- The budget constraint expresses the individual consumption possibilities of the consumer we are studying, and shows all the combinations of goods, the baskets, that are purchasable for the consumer.
- We start our analysis from the form : $I = p_1 x_1 + p_2 x_2$, where I is the consumer's income and p_1, p_2 are the prices of goods 1 and 2, and we rewrite it in the form $x_2 = \frac{I}{p_2} - \frac{p_1}{p_2} x_1$.
- What is the slope? $-\frac{p_1}{p_2}$, or the ratio of the prices.
- Which are the intercepts? The intercept on the x_2 axis (when $x_1 = 0$) is $\frac{I}{p_2}$, whereas the intercept on the x_1 axis is $\frac{I}{p_1}$. Thus, the intercepts of the budget constraint represent how many units of a good the consumer would have the possibility to buy if he/she decided to buy only that good, i.e., if he/she allocated his/her entire income to one good.

THE BUDGET CONSTRAINT

- **Exercise:** Given the price of good 1, $p_1 = 5$, the price of good 2, $p_2 = 10$, and the consumer's income, I = 100, find:
  i. the equation of the budget constraint derived from the definition,
  ii. the equation of the budget constraint so that it can be drawn on a graph,
  iii. the slope and intercepts.

ADDITIONAL EXERCISES

- **Exercise:** Given the following utility function : $U(x_1, x_2) = x_1 x_2 + x_1$, find
  i. the equation of a generic indifference curve,
  ii. the equation of the indifference curve relative to the utility level $\bar{U} = 10$,
  iii. the slope of the indifference curves.

ADDITIONAL EXERCISES

- **Exercise:** Given the price of good 1, $p_1 = 1$, the price of good 2, $p_2 = 4$, and the consumer's income, I = 20, find:
  i. the equation of the budget constraint derived from the definition,
  ii. the equation of the budget constraint so that it can be drawn on a graph,
  iii. the slope and intercepts.