MICROECONOMICS I.
"B"

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week 5

Preferences, utility, part 1

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The course was prepaerd by Gergely Kőhegyi, using *Jack Hirshleifer, Amihai Glazer and David Hirshleifer (2009) Mikroökonómia. Budapest: Osiris Kiadó, ELTECON-books (henceforth HGH)*, and *Gábor Kertesi (ed.) (2004) Mikroökonómia előadásvázlatok. http://econ.core.hu/ kertesi/kertesimikro/ (henceforth KG).*

Consumption choices

The problem of consumption choice in microeconomics is simply this:

- How do we get income? (we deal with this later)
- How do we spend it? (this is consumption theory)

The economic actor tries to make the best decision within her/his set of choices. This is the essence of all optimization decision. In consumption theory:

- economic actor: consumer
- the subject of decision: which good(s) to choose? (e.g. stew with dumplings or breaded pork with potato, or bread and butter for a whole year but a trip to the Riviera on the summer... etc.)
- constraints: income and the price of the goods (we assume that these are given, or at least that the consumer thinks that s/he cannot affect these)
- what is the best (second best, third best, etc.) depends on the tastes or PREFERENCES of the consumer. (we deal with these for now, independent of consumer constraints)

Preferences

"Laws" of preference

Definition 1. *The* basket of commodities *is an arbitrary combination of goods (e.g. a bawl of spinach with two meatballs, or a bike and two concert tickets and two gyros, or 4 hours of study and a cup of coffee, etc.)*

Taste practically shows which basket of commodities a consumer prefers to another.
E.g.: Which would be better?

- 1 bawl of spinach and 2 meatballs OR 2 bawls of spinach and 1 meatball
- 1 bike and 2 concert tickets and 1 gyros OR 2 bikes and 0 concert tickets and 3 gyros?
- 10 hours of study and 4 cups of coffee and 0 mugs of beer OR 10 minutes study and 0 cups of coffee and 4 mugs of beer?

The microeconomic model on tastes, i.e. on preferences is based on two "axioms":

- The *axiom of comparison.* a person can compare and two baskets A and B of commodities. Such comparison must lead to one of the following three results:
  - S/he prefers A basket over B,
  - or prefers B basket over A,
  - or is indifferent between A and B.
- The *axiom of transitivity*: Consider and three basket A, B and C. If a consumer prefers A to B, and also prefers B to C, s/he must prefer A to C. Similarly, a person, who is indifferent between A and B, and is also indifferent between B and C, must be indifferent between A and C.

Transitivity of preferences

Age and transitivity
It seems that we learn to order things transitively as we age, and this is not a skill we are born with. There are many (psychological) explanations for these results. However we assume stable and transitive preferences in microeconomics.

Age	Number of subjects	percentage of intransitive choices
4	39	83
5	33	82
6	23	82
7	35	78
8	40	68
9	52	57
10	45	52
11	65	37
12	81	23
13	81	41
Adults	99	13

Assumption 1. *A consumer can consistently rank all baskets of commodities in order of preference. This ranking is called "the preference function".*

Definition 2. *Signs:*

- $A \preceq B$*: B weakly preferred to A, or B is at least as good (as good or better) as A basket.*
- $A \prec B$*: B strictly preferred to A, or B is better than A basket.*
- $A \sim B$*: B is indifferent to A, or B is as good as A basket .*

Graphical depiction of basket of commodities

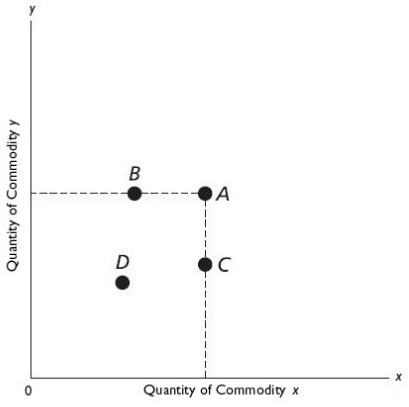
- Let's assume that the consumer consumes the following commodities: Spinach (X_1), meatball (X_2), tax consulting (X_3), petrol (X_4), apple (X_5), sour cream (X_6), ..., Barbie doll (X_{n-1}), flowers (X_n)
- Let's fix an arbitrary order of these commodities. (e.g. X_2 will always mean meatball and never e.g. flowers) Let's signal the consumed quantity by $x_1, x_2, \ldots, x_n$ for each commodity, respectively.
- Then $\mathbf{x} = (x_1, x_2, \ldots, x_n)$ ordered sequence (vector) will show a basket of commodities. e.g. $\mathbf{x} = (2, 3, 0, 10, 2, 1, \ldots)$ means that our consumer consumes 2 bawls of spinach, 3 meatballs, 10 l petrol, 2 apples, 1 sour cream, etc. under a given time (e.g. 1 day).
- If the consumer consumes only two commodities, ($n = 2$), then (x, y) basket of commodities can be depicted on two x and y axes. We usually use the $A, B, C, \ldots$ letters to signal the baskets.
- Henceforth we assume that $x, y \geq 0$, i.e. consuming negative quantities is impossible. (In theory a possible interpretation would be e.g. $x_2 = 3$, if someone eats 3 meatballs and $x_2 = -3$, if s/he bakes 3 meatballs). Thus only the positive quarter of the x and y axes.

- The number of baskets can further be narrowed, if e.g. we can only consume discrete quantities, or there is a physical limit to consuming a commodity, etc.

Definition 3. Consumption set *is the sum of the commodities that are available for the consumer.*

Note 1. *All our discussions can be generalized to an n-dimensional commodity space, but all the important problems and working tools are present with the two dimensional space as well; hence we stick with this.*

Points A, B, C and D represent different combinations or baskets of commodity X and commodity Y. If X and Y are both goods then basket A is preferred to any of the other market points.



Excercise (HGH 3.1): Jane prefers basket A consisting of one beer and one taco, to either (i) basket B consisting of two beers alone, or (ii) basket T, consisting of two tacos alone. Comparing the last two baskets, suppose she should rather have two beers than two tacos. Do these facts indicate that the Axiom of Comparability and the axiom of Transitivity apply for Jane, at least for the three combinations described? If they do apply, what is her rank ordering of preferences?

Note 2. *Not all rank ordering of preferences can graphically be depicted*

E.g.: Lexicographical preferences (cf. lexicon) Lajos is a millionaire, loves cars and likes sailing boats. From two baskets he will always choose the one with more cars, independent of the number of boats. However, if the number of cars are the same in the two baskets, he will choose the one with more boats. Try to draw this ordering of preferences.

Utility

Utility

Definition 4. *A* good *is a commodity for which more is preferred to less; a* bad *is a commodity for which the reverse holds.*

Definition 5. *Utility (U) is the variable whose relative magnitude indicates the direction of preference In finding his or her preferred position the individual is said to maximize utility.*

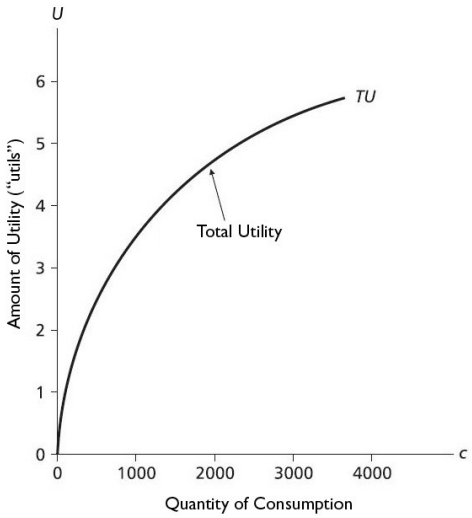
Problems:

- If for a consumer $U = 10$, and for another $U = 5$, then is the welfare of the society made of these two people $W = 10 + 5 = 15$? In other words, can the different utilities be added?
- What does it mean that $U = 100$, or $U = 3$? So what is the unit of utility? Can it be measured at all?

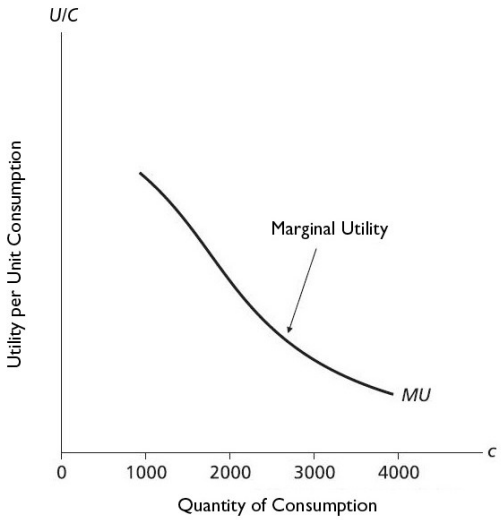
Definition 6. *Cardinal utility: the utility can be measured and quantified, and the units can be interpreted.*

Note 3. *The individual cardinal utilities can not always be added. (Complicated problem, we will return to this later.)*

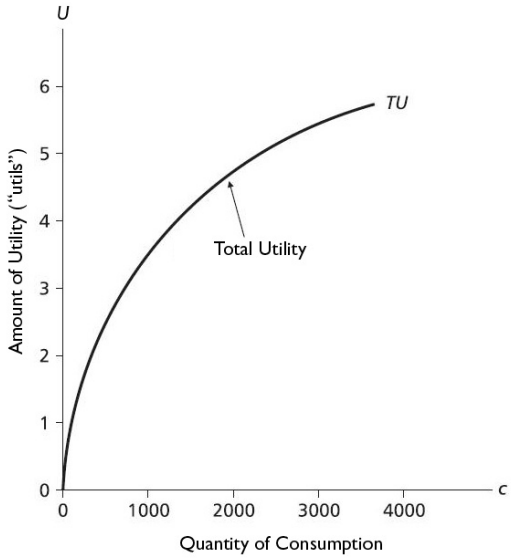
Utility function
The total utility curve $TU(c)$ is a "cardinally measured" utility function of c consumed quantity.

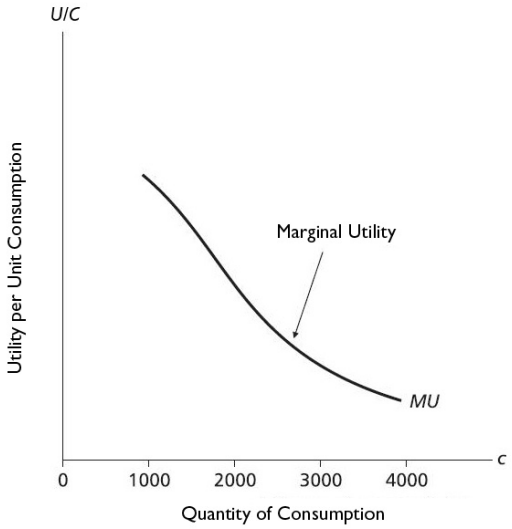


Marginal utility
Raising consumption raises utility by marginal utility



Marginal utility MU can be deducted from the total utility; it shows its slope. Raising consumption, raises total utility, but at a decreasing speed, thus marginal utility is positive but declining.





Assumption 2. *Law of diminishing marginal utility (Gossen's first law): marginal utility decreases with increased consumption.*

e.g.:

- How much money would you be willing to pay for a bawl of spinach? (if you had all the money in the world?) (utility in monetary units)
- Expected life-span
- Reproductive success: RS = offspring/parent ratio from one generation to the next
- How happy are you? (debated)

Relative income and life satisfaction in the United States, 1994 (percentage)

Total household income (thousand dollars)	„Very happy"	„Pretty happy"	„Npt too happy"
Less than 10 (dollars)	16	62	23
10–20	21	64	18
20–30	27	61	12
30–40	31	61	8
40–50	31	59	10
50–75	36	58	7
Greater than	44	49	6

Absolute income and life satisfaction (across nations), 1984

GNP per capita (dollar)	Number of nations	Median „satisfaction" score
Less than 2000	1	5,5
2000–4000	3	6,6
4000–8000	6	7,0
8000–16000	14	7,4

Bridewealth payments among the Kipsigis (cow equivalents)

	Early-maturing women	Late-maturing women
High price	32	14
Avergage price	19	23
Low price	14	28

Note 4. *Cardinal utility can be measured several ways. (e.g.: temperature can be measured in Celsius , or Kelvin, or Fahrenheit degrees)*

Definition 7. *Under* ordinal utility *a person may prefer basket A to basket B, and basket C to basket D, but need not be able to say "I prefer A over B* more *than I prefer C over D".*

Note 5. *If total utility is only an ordinal magnitude, whether marginal utility is positive or negative can still be determined, but not whether marginal utility is rising or falling. That last step would involve comparing utility differences. Ordinal utility is a weaker assumption than cardinal utility, but it suffices for analyzing most consumption choices.*

Utility of commodity baskets

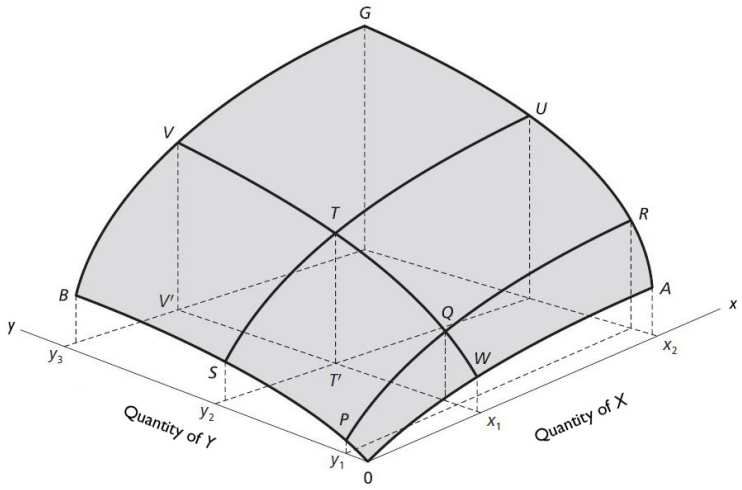
The utility of (x, y) commodity basket is given by $U(x, y)$ utility function.
e.g.:

- Let x: quantity of the consumed meat. (unit: pieces)
- Let y: quantity of the consumed French fries (units: 10 dkg)
- So $(x, y) = (2, 3)$ means that a consumer eats 2 pieces of meat with 30 dkg of French fries.
- Let Eve's utility function be: $U_E(x, y) = x^2y$
- Let Adam's utility function be : $U_A(x, y) = xy^2$
- Since $U_E(4, 2) = 4^2 \times 2 = 32 > U_E(3, 3) = 3^2 \times 3 = 27$ and $U_A(4, 2) = 4 \times 2^2 = 16 < U_A(3, 3) = 3 \times 3^2 = 27$, therefore Eve prefers basket $(4, 2)$ to $(3, 3)$, while Adam the other way around (they have different tastes).

Definition 8. *Partial utility functions define the utility of a consumer as a function of a commodity while the consumed quantity of the other commodity is fixed:*

$$U(x)|_{y_0} = U(x, y_0), U(y)|_{x_0} = U(x_0, y)$$

E.g. The partial utility functions of Eve and Adam with the quantity of French fries fixed to $y_0 = 3$: $U_E(x)|_{y=3} = 3x^2, U_A(x)|_{y=3} = 9x$



Definition 9.
- *The marginal utility of the first commodity (MU_1) shows how the utility of the consumer changes if we increase the consumed quantity of that commodity, everything else being unchanged.*
- *The marginal utility of the second commodity (MU_2) shows how the utility of the consumer changes if we increase the consumed quantity of that commodity, everything else being unchanged.*

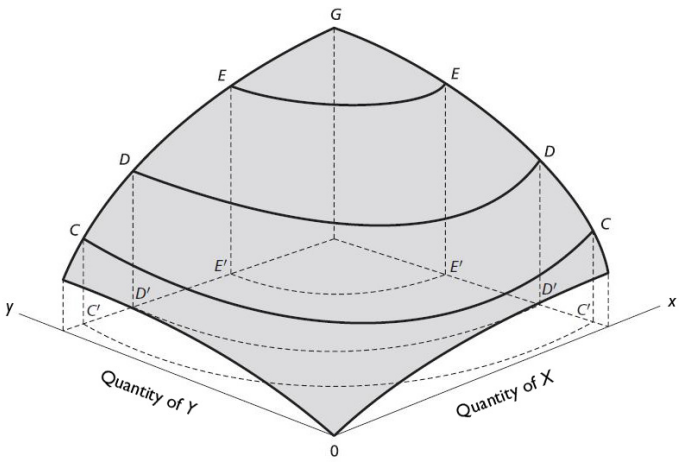
Definition 10. *Indifference curves: set of basket of commodities that have the same utility level, i.e. they are indifferent to each other.*

$$U(x,y) = U_0 \Rightarrow y = f(x)|_{U_0}$$

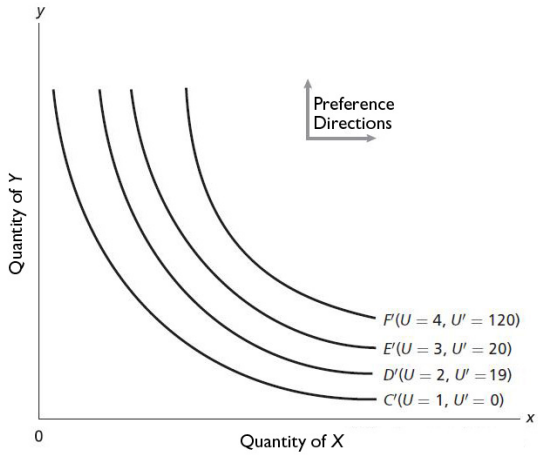
E.g.: For Eve and Adam the baskets of commodities that have the same $U_0 = 32$ utility level are:

$$U_E(x,y) = x^2 y = 32, U_A(x,y) = xy^2 = 32$$

$$y = \left.\frac{32}{x^2}\right|_{U_E=32}, \; y = 4\left.\sqrt{\frac{2}{x}}\right|_{U_A=32}$$

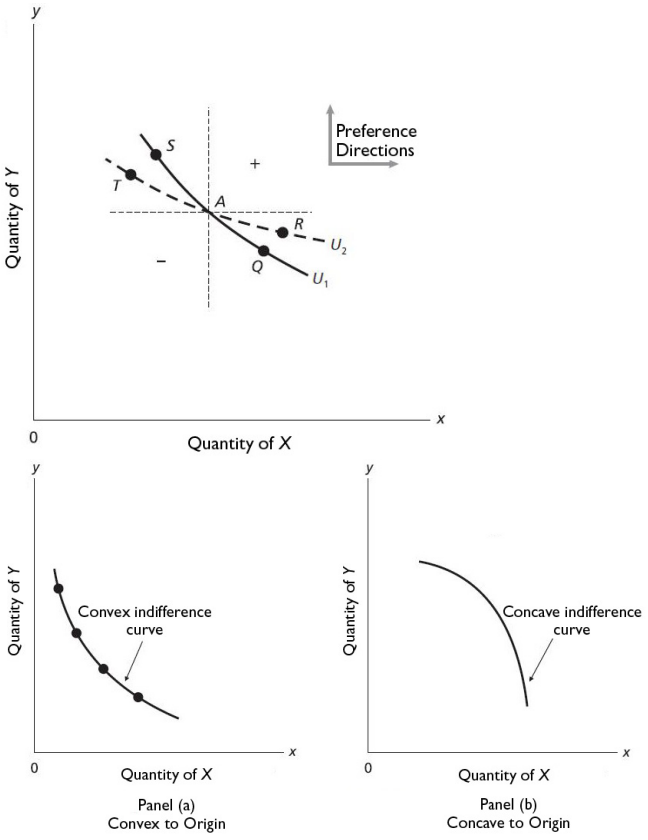


indifference curves
Level contours of utility. Here the cardinal (vertical) scaling of utility has been stripped away, leaving the indifference curves. These indifference curves, together with the preference directions, provide all the information needed to rank alternative consumption baskets in terms of *ordinal* utility.



Characteristics of the indifference curves

1. Negative slope
2. Indifference curves never intersect
3. Coverage of indifference curves (an indifference curve passes through each point in commodity space, so there is always another curve between any two curves)
4. Indifference curves are convex to the origin



Note 6. *Convexity cannot be* proved *from the postulates of rational choice, as for the other three characteristics. Rather, it is based on the well established principle of "diversity in consumption."*