Economics; 11.11.2022

3 Identifying the consumer optimum

3.1 Marginal Rate of Substitution in Exchange and Consumption (MRSe; MRSC)

a) Marginal Rate of Substitution in Exchange (MRSE)

describes the rate at which the individual can exchange goods at the market

* How you can exchange goods 🡪 determined by the price
* How much of another good (B) you get if you give up one of the other good (A)

Example:   
PA=2 PB=1

PA/PB = 2/1 = 2

If you give up 1 Apple you can get 2 Bananas.

Example 2:

PA=2 PB=0,5  
PA/PB = 2/0,5 = 4

If you give up 1 Apple you can get 4 Bananas (on the market)

MRSE is equal to the relative price (e.g. the price (price relative to other goods)

MRSE is always a positive number

MRSE = PA/PB  *MRSE ist gleich Preis A geteilt durch Preis B*

b) Marginal Rate of Substitution in Consumption (MRSC)

is the ratio at which the individual is willing to subsititute (give up) a small amount of A in her consumption basket (to get one of B)

* “How much of A am I willing to give up in exchange for one of B”

MRSC is the absolute value of the slope of the indifference curve [Indifference curve is the curve of all combinations which give equal utility]

MRSC = - dxb/dxa  *MRSC ist gleich die Differenz von Produkt B geteilt durch die Differenz von Produkt A; Betrag der Ableitung*

How many of A am I willing to give up for B

* Depends on the preferences (individual situation, budget, etc)
* Can only be know if we ask 🡪 changes depending on individual situation

Slope of the indifference curve: dxA/dxB  
*Ableitung am Punkt/Ableitung am Punkt B;*

z.B.: f(x) = x2  
f‘(x) = dxa/dxb = 2x

3.2 Finding the consumer optimum (graphical solution)

Graphisch : Steigung ablesen

Bild einfügen

Consumer Optimum = tangency point of highest possible indifference curve and the budget constraint

The budget must be tangent to the indifference curve (touches it in 1 point)  
slope of the indifference curve = slope of the budget constraint

One wants to go out as far as possible but you cannot go beyond the budget constraint line

Always assume that we only have two products and are willing to spend all our income (otherwise more complicated model is needed/third product is needed)

Condition for the consumer optimum :   
MRSE = MRSC  
how much we can get must be equal to what we are willing to give up

3.3 total derivatives

Derivations with multiple variables

First : derive in respect to one variable

Second: derive in respect to the second variable

Third: add the two derivations

3.4 Calculating the consumer optimum (mathematical solution)

Mathematical concept:   
how does the value of the function change (the dependent variable U=utility) when the independent variables   
xA = Apples xB = Bananas

Economical concept:  
no change of the utility along an indifference curve (utility stays the same; dU=0)  
=> dU = 0

= This allows us to calculate the slope of the indifference curve (dxA/dxB)

* d = Unterschiede zwischen Punkt 1 und Punkt 2 in der Ableitung
  + hat man in der Schule immer weggelassen (
* Differential: unendlich kleiner Abschnitt auf Zahlenstrahl
* muss hier mitgenommen werden, da man sonst nicht weiß woher die Änderung kommt

**Example**:  
1) utility function   
U = U(xA; xB) = xa2 \* xb

1. Total derivatives

Partial derivatives

1. dU/dxa = 2xa \* xb  
   dU = 2xa \* xb \* dxa
2. dU/dxb = xa2 \* dxb  
   dU = xa2 \* dxb

total differential :   
dU = 2xa\*xb\* dxa + xa2 \* dxb

0 = 2xaxb \* dxa + xa2 \* dxb   
-2xaxab \* dxa = xa2 \* dxb   
-2xaxb \* dxa = dxb

-2xaxb/xa2 = -2xb/xa = dxa/dxb

Slope of the indifférence curve for the example (Steigung in unendlich kleinem Intervall)

2 budget constraint

300 = 2xa + 1xb  
y = xb = 300 – 2xa   
-2 is the slope (Steigung) of the budget constraint

Consumer optimum:

Condition for the optimum:   
slope of the indifference curve = slope of the budget constraint (Tangentenregel)

dxa/dxb = -2xb/xa = -2

2xb = 2xa

xb = xb

the optimal consumer utility would be an equal amount of apples and bananas

the result will be put into the budget constraint equation:

xb = 300 – 2xa

xa = 300 – 2xa   
3xa = 300  
xa = 100

xa = xb = 100 consumer optimum

with 100 apples and bananas the optimal utility is reached with our budget