

Chapter 7

Utility maximization

Apr 29
Wed

* Utility: The amount satisfaction a person gets from consumption of a certain item.

* Characteristics of utility :-

1. Utility "منفعة" and usefulness "فائدة" are not synonymous. Utility "منفعة" \neq usefulness "فائدة".
المنفعة "Utility" \neq الفائدة "useful".
فائدة \neq منفعة. \leftarrow منفعة \neq فائدة.

2. Utility is subjective

3. Utility is difficult to quantify "من الصعب قياسها"

* Total utility and Marginal utility:

TU: The total amount of satisfaction a person derives from consuming some specific quantities.

MU: The extra utility a consumer gets from additional or extra unit of specific product. "منفعة إضافية / وحدة"

$$MU = \frac{\Delta TU}{\Delta Q} = \frac{TU_2 - TU_1}{Q_2 - Q_1}$$

example \rightarrow

example:

Q	TU	MU
0	0	—
1	10	10
2	18	8
3	24	6
4	28	4
5	30	2
6	30	0
7	28	-2

$$MU = \frac{TU_2 - TU_1}{Q_2 - Q_1}$$

8 = { ... }
8 = ...

⊕ دائمة TU تكون

أكثر MU مع تزايد

* كلما زاد Q

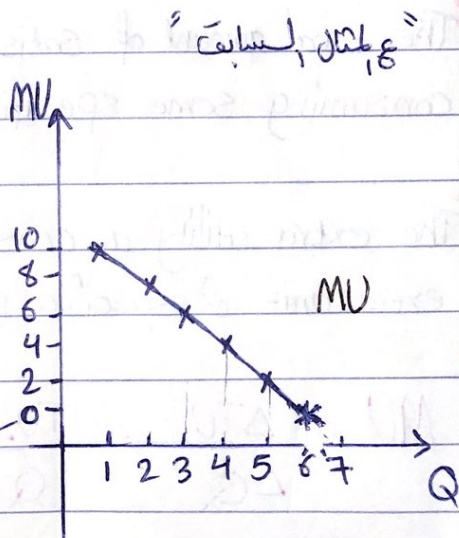
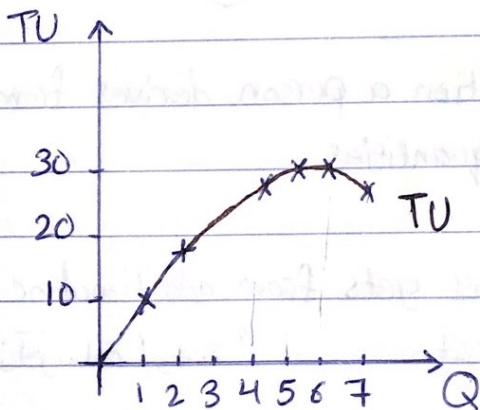
MU ↓

Diminishing of MU ← قانون

تفقدنا الوحدة الحرة

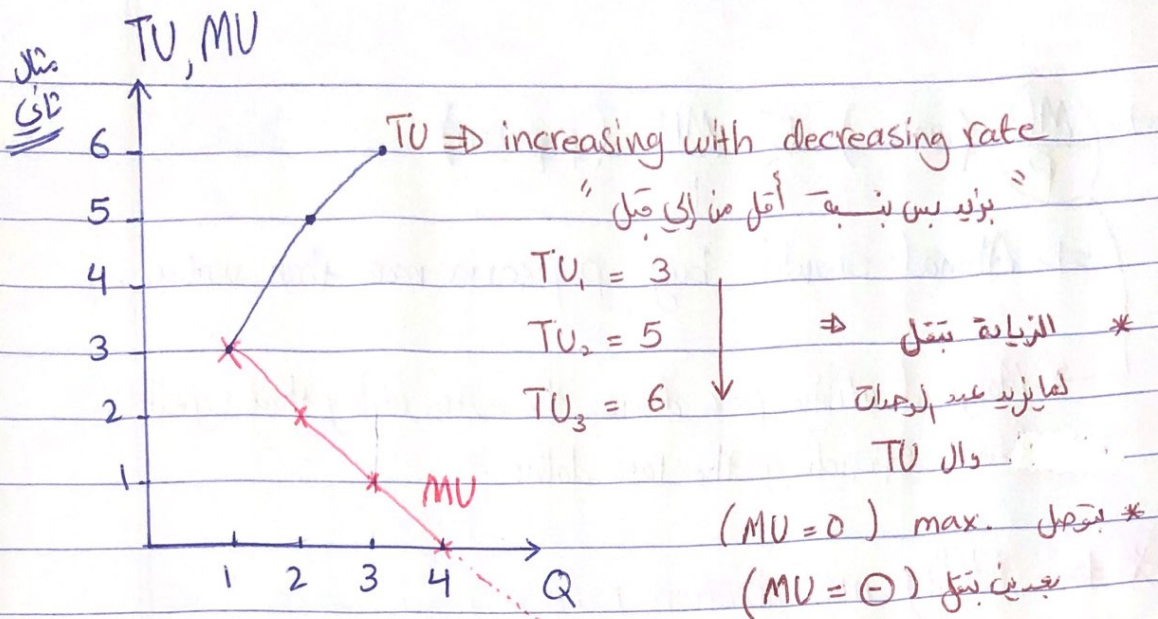
↳ The marginal utility derived "تزداد" from successive "متتالية" units of a given product will decline.

⇒ Q ↑ ⇒ MU ↓



تلك الوحدة التي لم يبق

"عكس، السالب"



* $MU = 0 \Rightarrow \therefore TU = \text{maximum}$

* $MU : \text{max.} \Rightarrow TU : \text{min.}$

* Utility maximizing rule:

\Rightarrow To maximize satisfaction, the consumer should allocate his money so that the last dollar spent on each product yeild the same amount of marginal utility.

May 5, 2

ex: Ahmad purchases two products; mineral water and popcorn, MU (mineral water) is 70 and MU (popcorn) is 60. The price of a bottle of mineral water is \$2 and the price of a box of popcorn is \$1.15. How should Ahmad buy?

Sol: $\frac{MU}{P} \Rightarrow \frac{70}{2} = 35, \frac{60}{1.15} = 52.17$

$$\Rightarrow \frac{MU}{P} (\text{water}) < \frac{MU}{P} (\text{popcorn})$$

⇒ Ahmad should buy popcorn more than water.

→ Marginal utility per dollar: the extra utility that yields from spending the last dollar.

*⇒ Utility maximization rule:

$$1. \frac{MU_x}{P_x} = \frac{MU_y}{P_y}$$

$$2. I = P_x X + P_y Y$$

"to maximize ---- & الحد الأقصى"

example: Mohammad has \$24 to spend each day, the only two goods he is interesting in purchasing are apple and orange. MU for ^{the} two goods are shown below, price (Apple) = \$4 and price (orange) = \$2.

Apple			Orange			الطلب كم لازم يشتري تاج؟ وكم برتقال؟
Q	MU	MU/P	Q	MU	MU/P	
1	48	12	1	24	12	⇒ What quantity of each good will Mohammad purchase to maximize utility? الرجح: Rule (قوة) →
2	32	8	2	15	7.5	
3	24	6	3	12	6	
4	16	4	4	8	4	
5	8	2	5	6	3	
6	4	1	6	4	2	

MU/\$	Apple, orange		
12	1	1	6
6	3	3	18
4	4	4	24
2	5	6	<u>32</u>

ما يزيد
لأنه ال Income \$24 =

⇒ 4 apples + 4 oranges.

↓

* How much the total utility that Ahmad gets from

$$TU = 48 + 32 + 24 + 16$$

$$+ 24 + 15 + 12 + 18$$

$$= 179 \text{ units.}$$

↳ Max. Utility.

consuming
these quantities

May 11, 20

* Suppose that the price of apple has increased from 4 to 8, while the price of orange and income remain unchanged. How much apple and orange will consume at this new price.

	MU/P
1	6
2	4
3	3
4	2
5	1
6	0.5

MU/P
ال Orange

⇒ 2 apples & 4 oranges.

$$(2 \times 8) + (4 \times 2)$$

$$= 16 + 8 = \$24$$



Apple			Orange		
Q	MU	MU/P	Q	MU	MU/P
1	48	6	1	24	12
2	32	4	2	15	7.5
3	24	3	3	12	6
4	16	2	4	8	4
5	8	1	5	6	3
6	4	0.5	6	4	2

Price (Apple) = \$8

MU/P	Q	Price (Total)	
6	1, 3	\$14	→ Best choice:
4	2, 4	24	2 Apples +
3	3, 5	34	4 Oranges
2	4, 6	44	(according to the income)

↓
\$24

* Water diamond paradox.

→ Water & diamond: Water has great supply relative to demand → \sum السلاسل

But: Diamonds are rare (نادر), supply is small relative to demand → السلاسل قليلة

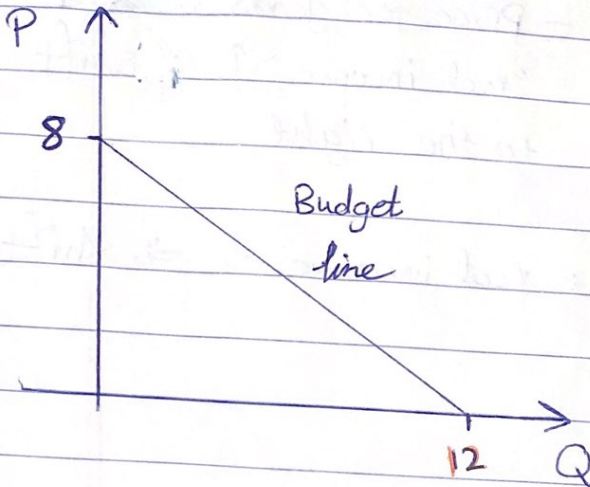
* Water ⇒ MU: last unit of water is very low (MU↓)

Diamonds ⇒ MU: last unit of diamond is high (MU↑)

~~MU~~ MU السلاسل من أجل Supply & demand

"ذات، لمزانية"

* **Budget line** : Scheduling or curve showing various combinations of two products a consumer can purchase with specific money income.



* $P_A = \$1.5 \Rightarrow \frac{12}{1.5} = 8$
 (الوحدة)

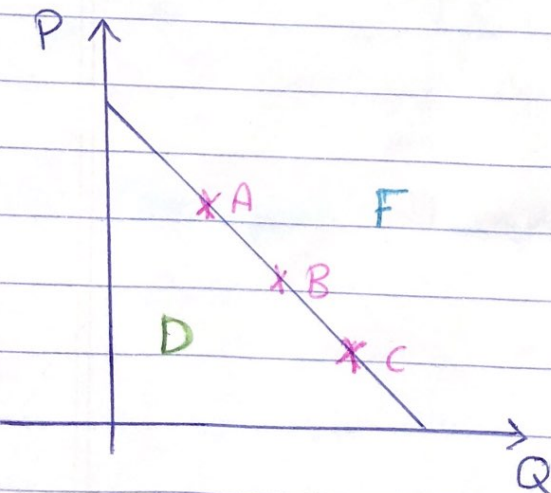
إذا بقي أشترى كل، اشترى
 من سلعة A

* $P_B = \$1 \rightarrow \frac{12}{1}$

= \$12

If you buy 3B : $3(1) + Q_A(1.5) = 12$

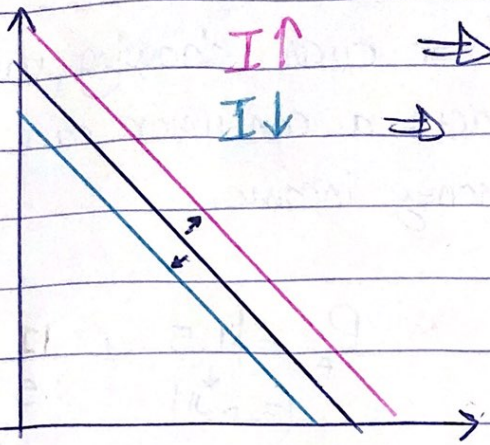
$(1.5) * Q_A = 9 \Rightarrow \boxed{Q_A = 6}$



A, B, C : Attainable
 "consumer spend all income"

D: Attainable
 "consumer doesn't spend all income"

F: Unattainable
 "غير متاح" كاشي اشترى
 كل ما



$I \uparrow \Rightarrow$ shift to the right
 $I \downarrow \Rightarrow$ shift to the left

- Price for goods \downarrow ~~is~~ $I \uparrow$
 "real income" $\uparrow \Rightarrow$ shift
 to the right.

- Price for goods \uparrow : real income $\downarrow \Rightarrow$ shift
 to the left.