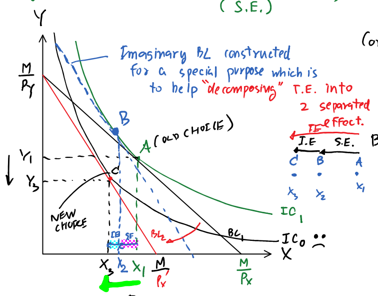
Change in a consumer's equilibrium

Tuesday, October 30, 2018 09:42 AM

Back to ordinal approach (= IC & BL Analysis) ...

Main question : What will happen to a consumer's optimal choice if price of a good changes ?

Key terms : Substitution effect (S.E.), Income effect (I.E.), Total effect (T.E.)



Consider 2 goods: x & Y

P_x = price of good x (baht/unit)

P_Y = price of good Y (baht/unit)

M = money income (baht/wk)

BL equation : $P_x \cdot X + P_Y \cdot Y = M$

or $Y = \frac{M}{P_Y} - \frac{P_x}{P_Y} X$

Scope of BL

Fact#1 Initially, an optimal choice is at Basket $A(x_1, Y_1)$.

He is on IC_1

Fact#2 Suppose P_x ↑... From P_x to P_x' ...

Then BL rotates inwards from BL_1 to BL_2.

New consumption choice would be at Basket $C'(X_3, Y_3)$

Amount of x ↓ From $x_1 \to x_3$

Amount of Y ↓ From $Y_1 \to Y_3$ } → consequence his utility Falls... (Now he falls to the lower IC.)

So Far,

OLD CHOICE $A(x_1, Y_1)$ ON IC_1

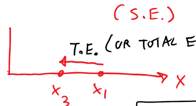
NEW CHOICE $C'(x_3, Y_3)$ ON IC_0

Utility falls... due to ↑P_x

Fact#3*** Q: When P_x ↑, what are the driving forces that "induce" him to buy less of x from $x_1 \to x_3$?

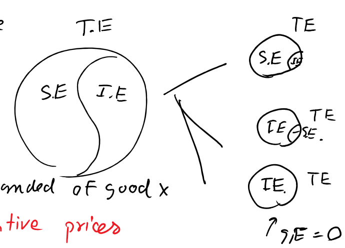
A: The reasons inducing him to buy less of good x are

SUBSTITUTION EFFECT (S.E.) & INCOME EFFECT (I.E.) !



T.E. (OR TOTAL EFFECT OF PRICE CHANGE) which is the combination of S.E. and I.E.

In short : $\boxed{\text{T.E.} = \text{S.E} + \text{I.E}}$



Substitution Effect : Change in quantity demanded of good x due to change in relative prices holding utility constant.

Income Effect : Change in quantity demanded of good x due to change in his purchasing power or his real income when he faces with the new relative price.

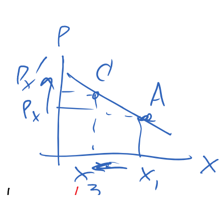
$$\text{T.E.} = \text{S.E} + \text{I.E.}$$

$$\Delta Q^d_x = \Delta Q^d_{x,\text{ due to } \Delta \frac{P_x}{P_Y}} + \Delta Q^d_{x,\text{ due to } \Delta \text{ in purchasing power}}$$

$x_3 \xleftarrow{\text{T.E}} x_1$ (I.E, S.E)

SUMMARY

x becomes more expensive relative to Y $\xrightarrow{\text{VIA S.E.}}$ Q^d_x ↓ (buy less of x)

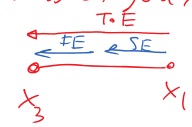


SUMMARY

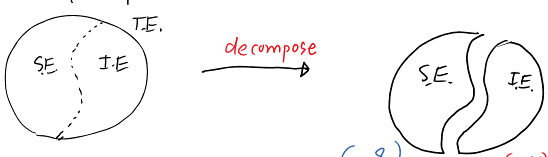
$P_x \uparrow$
- → x becomes more expensive relative to Y —VIA S.E.→ $Q^d_x \downarrow$ (buy less of x)
- → makes his purchasing power or his real income falls... (He becomes effectively poorer ... ☹) —VIA I.E.→ $Q^d_x \downarrow$ (buy less of x)

→ $Q^d_x \downarrow$ (buy less of x DUE TO S.E AND I.E)

Both effects induce him to buy less of good X

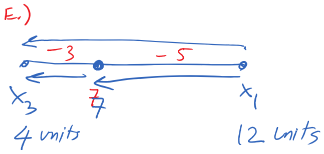


Fact #4 Let's {explode / breakdown / decompose} T.E into two separated effect, namely S.E. and I.E.



$$\underset{(T.E.)}{\overset{(-8)}{\Delta Q^d_x}} = \overset{(-5)}{\Delta Q^d_{x,\,S.E.}} + \overset{(-3)}{\Delta Q^d_{x,\,I.E}}$$

Ex:



How to decompose?

Technical details first, Intuition will be provided later...

To decompose, do the following steps:

① Create a budget line which is called "imaginary budget line or hypothetical budget line.

This BL must have the following features

① It must parallel w/ the new budget line, BL_2

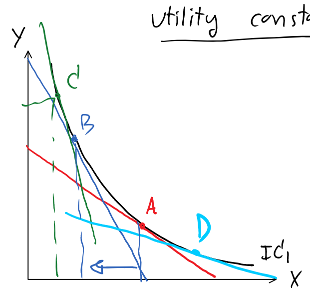
and ② It touches at the old indifference curve, namely IC_1.

Above may be considered as "a technical method" of how to "decompose" or "break down" T.E. into S.E and I.E.

Now, we want to understand an economic logic of why doing sth like above helps us to break down T.E. into S.E. and I.E

First, recall the definition of S.E.

S.E. ⇒ ΔQ^d_x due to Δ in $\frac{P_x}{P_y}$, holding utility constant.



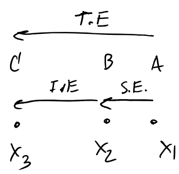
→ w/ red slope, he picks A.

→ w/ blue slope, he picks B.

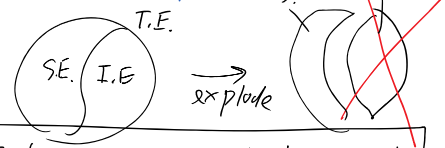
Notice that he is able to maintain or hold his utility constant when he adjust his basket from A → B

What he really did is ...

Second,



buy less of x and more of y



> To see the pure substitution effect, we must "eliminate" or "kill" income effect.

Then, how to kill I.E ?

To kill or eliminate IE, we ask the following question:

In facing w/ the new relative price : b/f : $\frac{P_x}{P_y}$ (OLD) $\rightarrow$ a/f : $\frac{P_x'}{P_y}$ (NEW)

you observe that he moves himself from basket A on IC_1 to basket C' on IC_0. :(

He is now being hurt by 2 factors :

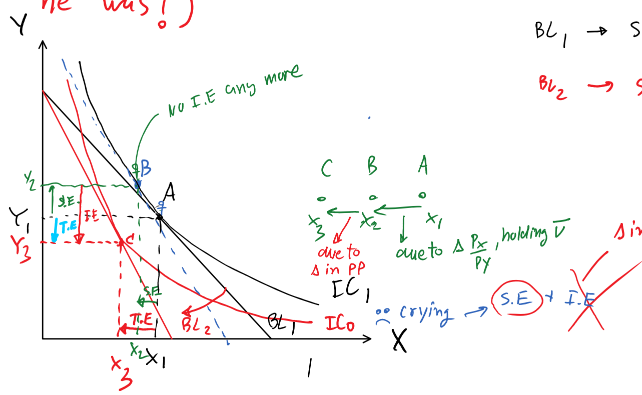
① $\Delta \frac{P_x}{P_y} \rightarrow$ to S.E.

(+ ② fall in his purchasing power : he becomes poorer :) Refered to I.E.)

We must kill I.E in order to see pure S.E.

To kill I.E, we "compensate" him w/ some more money income so that he can arrive w/ the old utility curve. Once he arrive at the old utility curve, he must shut up his complaint about suffering from income effect.

(I.E. is about effect of Δ in real income. To undo this effect we must bring him back to the old happiness level he was!)



$BL_1 \rightarrow$ slope $= -\frac{P_x}{P_y}$,

$BL_2 \rightarrow$ slope $= -\frac{P_x'}{P_y}$ where $P_x' > P_x$.

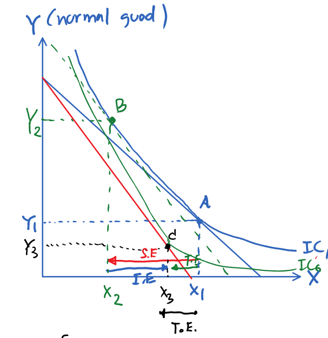
Above is the case where good x is a normal good...

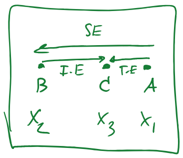
It means that when his real income ↑ → he buy more
" ———— " ↓ → he buy less.

Next : we consider the second case where good x is an inferior good : when real income ↓, buy more
" ———— " ↑, buy less.

Y (normal good)

Next : we consider the second case where good x is an inferior good : when real income ↓ , buy more
" " ↑, buy less .





Flow of analysis

P_x↑ → x becomes more expensive relative to Y $\xrightarrow{\text{VIA S.E}}$ he buys less of x (Q^d_x ↓)

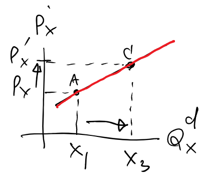
→ his real income ↓ or his purchasing power ↓ (= he becomes poorer effectively) & since x is an inferior good in his perspective $\xrightarrow{\text{VIA I.E}}$ he buys more of x (Q^d_x ↑)

→ WHEN*** S.E > I.E → Q^d_x ↓
↓Q^d_x ↑Q^d_x

CASE 3 when good x is a giffen good (= super inferior good)

Definition ⇒ Good x is a giffen good if an increase in price of good x induces a consumer to buy more of the good .

	When	P_x ↑ ,	Q^d_x ↑
and	when	P_x ↓ ,	Q^d_x ↓



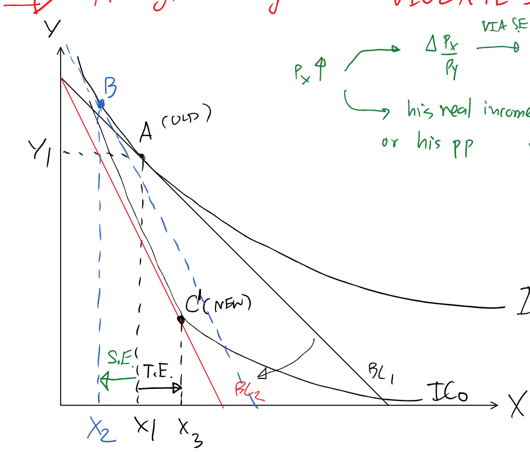
demand curve for a giffen good is sloping upward!

⇒ A giffen good VIOLATES Law of Demand !!!

P_x↑ → $\Delta \frac{P_x}{P_y}$ $\xrightarrow{\text{VIA S.E.}}$ buy less of x (Q^d_x ↓)

→ his real income ↓ or his pp ↓ & since x is a super inferior good or giffen → buy more of x (Q^d_x ↑)

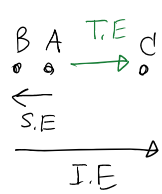
→ when IE > SE → Q^d_x ↑



Example Irish Potato Shortage in 18^{th} century .

P_{POTATO} ↑ → Q^d_{POTATO} ↑ (why?)

Explanation

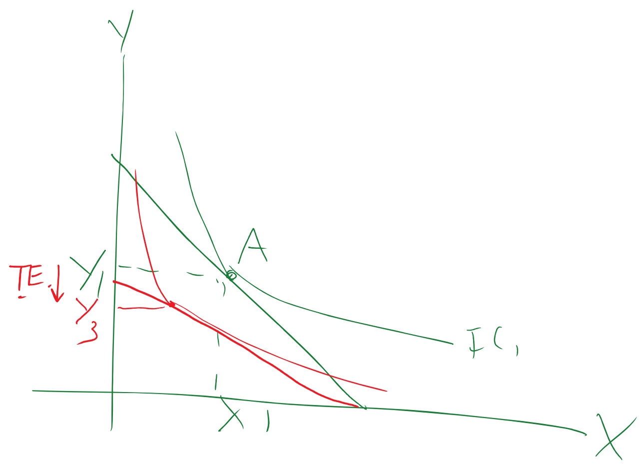


IE dominates SE

$\xrightarrow[\text{I.E}]{\text{S.E}}$

To be a giffen, the good must...

1. S.E. IS small
2. I.E must be big : = The consumer must spend large fraction of his income on this good. (like 80% of income is used to buy Potato)



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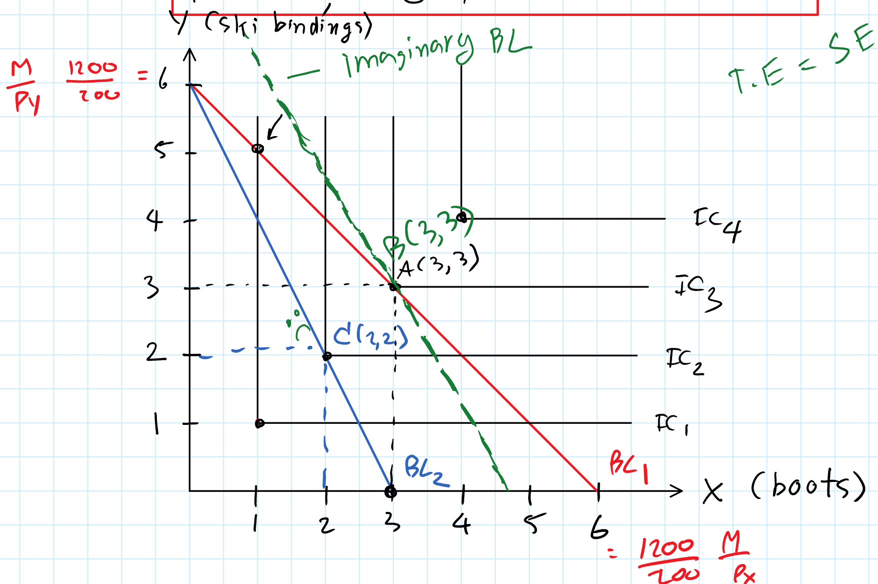
CASE 4 X & Y are "perfect complements"

Consider 2 goods: X (ski boots) & Y (ski bindings)

P_X = 200 € per pair of boots
P_Y = 200 € per pair of bindings.
M = 1200 € / year

T.E = ~~S.E + I.E~~ T.E = I.E

S.E = 0

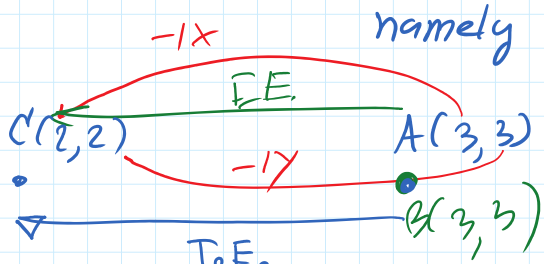


Fact #1 Given $P_X = 200$, $P_Y = 200$, $M = 1200$, A(3,3) is his utility maximizing choice (he is on the highest possible IC, namely on IC_3)

Fact #2 Suppose P_X rises from 200 € to 400 € / pair...

His Final choice is now at C(2,2).

His utility falls... (he is now on a lower IC, namely on IC_2.) :(



Fact #3 Let's break down Total Effect...

when X & Y are perfect complements, only income effect that influence his consumption choice.

S.E = 0 !!! since X & Y cannot be substituted
at all !!!

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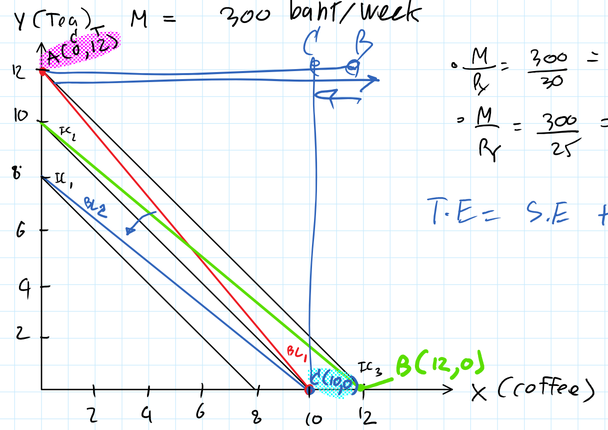
CASE 5 When X & Y are "perfect substitutes"

suppose X (coffee) & Y (tea)

$P_x = 30$ baht/cup
$P_y = 25$ baht/cup
$M = 300$ baht/week



• $\frac{M}{P_x} = \frac{300}{30} = 10$ cups/wk.

• $\frac{M}{P_y} = \frac{300}{25} = 12$ cups/wk

T.E = S.E + ~~I.E~~

Fact #1 Given $P_x = 30$, $P_y = 25$, $M = 300$, A (0, 12) is the optimal choice.
[spend all resources on the good that is relatively cheaper when the two goods are perfect substitutes)

Fact #2 If price of tea (good y) rises by 50%:

$P_y = 25 \xrightarrow{+50\%} P_y' = 37.5$ baht/cup

$\frac{M}{P_y} = \frac{300}{25} = 12 \longrightarrow \frac{M}{P_y'} = \frac{300}{37.5} = 8$ cups of tea at max he can buy if he buys no coffee

His new optimal choice is C (10, 0)

T.E

A (0, 12) (OLD CHOICE) ⟶ C (10, 0) (NEW CHOICE)

$P_x = 30$ $P_x = 30$

$P_y = 25$ $P_y' = 37.5$

BUY ONLY TEA since it is relatively cheaper

BUY ONLY COFFEE since it is now relatively cheaper.

T.E

$P_x = 30$, $P_y = 25$ — A (0, 12) OLD CHOICE $\xrightarrow{S.E}$ $P_x = 30$, $P_y' = 37.5$ — B (12, 0) $\xrightarrow{I.E}$ $P_x = 30$, $P_y' = 37.5$ — C (10, 0) FINAL CHOICE

IF this guy "were to have" enough income to afford his old utility level, in facing w/ the new relatives price ($P_x = 30$, $P_y' = 37.5$) he will buy ONLY the good

we kill I.E by utilizing imaginary

Unfortunately (12, 0) cannot be afforded since his real income falls the best affordable choice then is (10, 0) !!!

by utilizing imaginary BL in order to see PURE S.E.

in facing w/ the new relatives price ($P_x' = 30$, $P_y' = 37.5$) he will buy ONLY the good that is relatively cheaper now, which is good X (coffee)!

Choice then is (10, 0) !!!

Lesson ① S.E is relatively huge in this case where X & Y are perfect substitutes.

② I.E plays a minor role in explaining the adjustment of his basket from (0,12) → (10, 0)