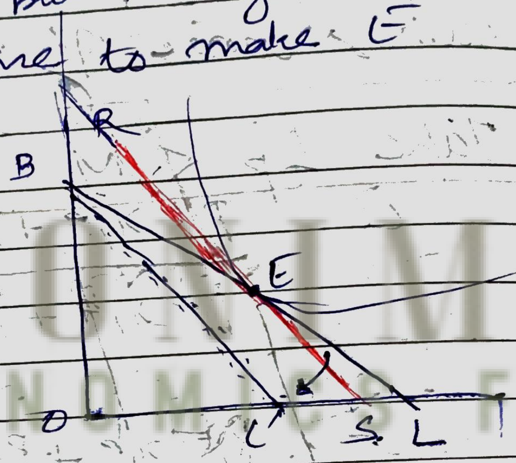
Ch 8

Slutsky Equation

Indexing and the Slutsky substitution effect.

Suppose P_1 increased but indexing makes sure there'll be enough income to make E affordable.



The indexing is geometrically shown by RS.

Originally with OBL, E was the bundle, then $P_1 \uparrow \Rightarrow$ OBL' and E is no longer available,

But indexing made sure E is available (shown by RS)

Remember, for any $y \in (ES]$, $E > y \in (ES]$.

When its OBL

E RP $y \in (EB]$

Thus after indexing also any bundle $y \in (ES]$ 'll not be chosen

In the new price situation, consumer equil'
'll be E [E'R]

Slutsky effect

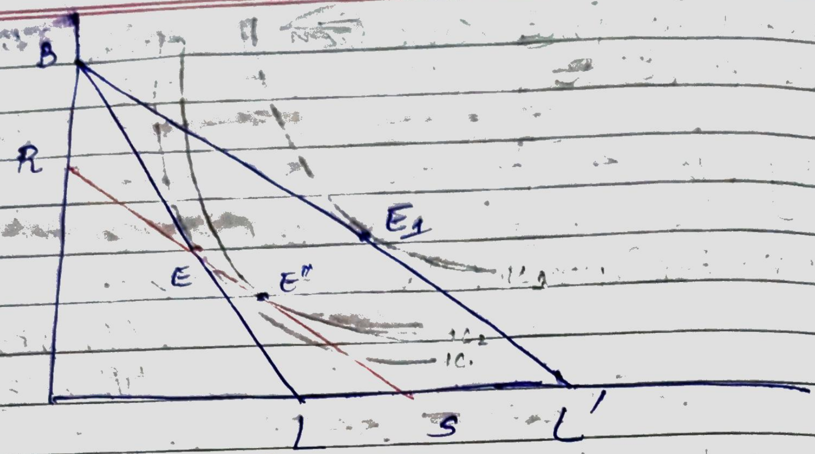
Consider Price of good 1 ↓ cet. par :

(P₁, P₂, m) to
(P₁', P₂, m)
$P_1' < P_1$

In order to show substitution effect (using Slutsky method) Take RS ∥ BL' s. it passes through E (not touching E as we did in first semester).
Thus we have kept the real income constant, but nominal income ↓ shown by RS.
E to E'' is relative price change where
E (P_1, P_2, m) & E' (P_1, P_2, m')
$m' < m$

Remember the consumer can choose any bundle between E & S. Why not RE? ∵ Because with OBL, E was chosen, when bundles ∈ (RE) was available ie E RP y ∈ (RE)'

Movement from E'' to E', is restoring back the nominal income that was taken away, thus showing income effect (assuming its a normal good).



$E \xrightarrow{SE} E'' \xrightarrow{IE} E_1$

$E \xrightarrow{PE} E_1$

At E, $P_1 x_1 + P_2 x_2 = m$.

At E (wrt RS), $P_1' x_1 + P_2 x_2 = m'$

$\Rightarrow \Delta m = m' - m = x_1 (P_1' - P_1)$

is negative $\because P_1' < P_1$

$\therefore \Delta m = (-)\Delta p \cdot x_1$

Numerical example.

$$x_1 = 10 + \frac{m}{10 p_1}$$

Let $m = 120$ $P_1 = 3$. $x_1 = 10 + \frac{120}{30} = 14$

$P\downarrow \Rightarrow$ $P_1 = 2$ $x_1 = 10 + \frac{120}{20} = 16$.

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Also $\Delta m = \Delta p \cdot x_1$

$= 1 \cdot 14$

$= \underline{\underline{14}}$.

$\therefore m' = m - \Delta m$

$= 120 - 14$

$= \underline{\underline{106}}$

$\therefore x_1 = 10 + \dfrac{106}{10 \times 2} = 10 + 5.3 = 15.3$.

m', p_1'

Substitution effect

Intermediate equilibrium pt E''.

$\therefore$ the price effect is as follows:

E	E''	E'
(P_1, P_2, m)	(P_1', P_2, m')	(P_1', P_2, m)
14	15.3	16

Δx_1^s Slutsky Substitution effect $= \underline{\underline{1.3}}$, Δx_1^n Income effect $= \underline{\underline{0.7}}$

14 ⟶ 16

Δx_1 Price effect $= 2$.

(ii)

$(\Delta x_1, ?_{00})$

Price effect
$$\Delta x_1 = x_1(p_1', p_2, m) - x_1(p_1, p_2, m).$$
Slutsky sub effect
$$\Delta x_1^s = x_1(p_1', p_2, m') - x_1(p_1, p_2, m)$$
Income effect
$$\Delta x_1^n = x_1(p_1', p_2, m) - x_1(p_1', p_2, m')$$
$x_1(p_1', p_2, m'')$ $\quad$ $x\, p_1', p_2, m$

Slutsky Substitution - "Sign"

The relationship between p & x is non-~~positive~~ ~~negative~~ positive (no change)
ie either the equilibrium 'll on E or it'll be on [y c (E-S)]. The change in the demand as per slutsky SE wrt to chnge in price is non-ve
∴ it is zero / +ve irrespective of either on E or on ES. normal / inferior.

Income effect - Sign
It is -ve for normal good
It is +ve for inferior good.

Magnitudes.

if $|SE| < |IE| \Rightarrow$ Giffen good.

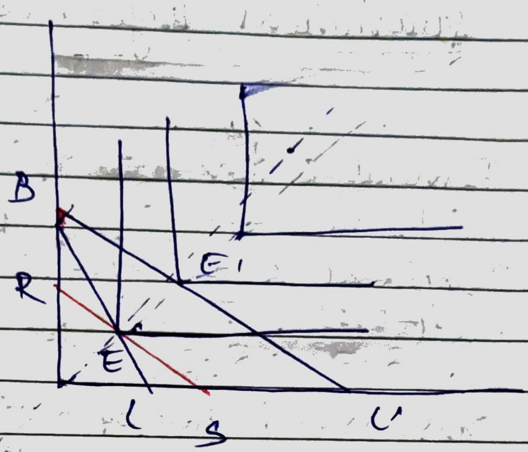
Subst effect is -ve

?.

Examples of Income and Substitution effects.

Perfect Complements

$p_1 \downarrow$



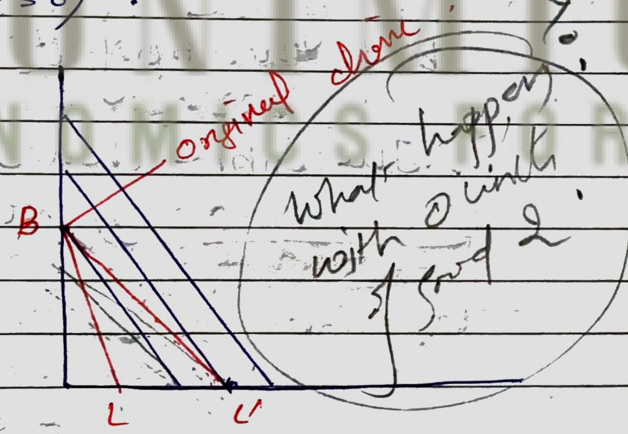
Here the intermediate equilbm is same as the original equilbm

$\Rightarrow SE = 0$.

The entire change in the qty demanded of good 1 happened due to change in the nominal income

$\therefore \Delta x_1 = \Delta x_1^n \; (\Delta x_1^s = 0)$.

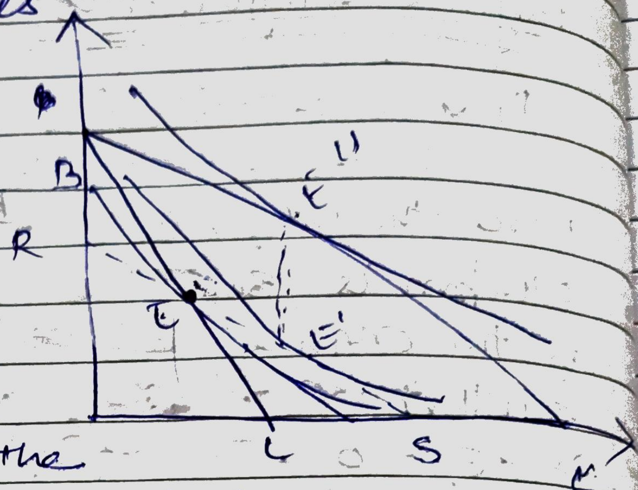
Perfect substitutes (when initially 0 units of good 1 was chosen).



When we pivot the budget line around the chosen pt, the optimal choice at the new BL is the same as at the old one — this means that the substitution effect is zero. The change in demand is due ~~to~~ entirely to the income effect.

When we tilt the BL, the demand bundle jumps from the vertical axis to horizontal axis there is no shifty to do. $\Delta x_1 = \Delta x_1^s \; (\Delta x_1^n = 0)$.

Quasilinear Preferences



Remember for quasilinear ICs, slopes at E' = slope at E''.

Thus as we give back the taken income back, due to this property, the new equilibrium will not be to the left or right of the intermediate equilibrium but will be to the top of E' (as slopes are equal).

∴ The entire change in demand is due to substitution effect

7 What about x_2?

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Rebating a tax.

Good 1 – gasoline
Good 2 – All other goods

Say price of ~~good~~ gasoline has to be increased to reduce consumption of gasoline so as to avoid the dependence on foreign oil.

Thus gasoline may be taxed at t.

If $p_1 = p$ and $x_2 = y$ with $p_2 = 1$ (as price of all other goods $= 1$)

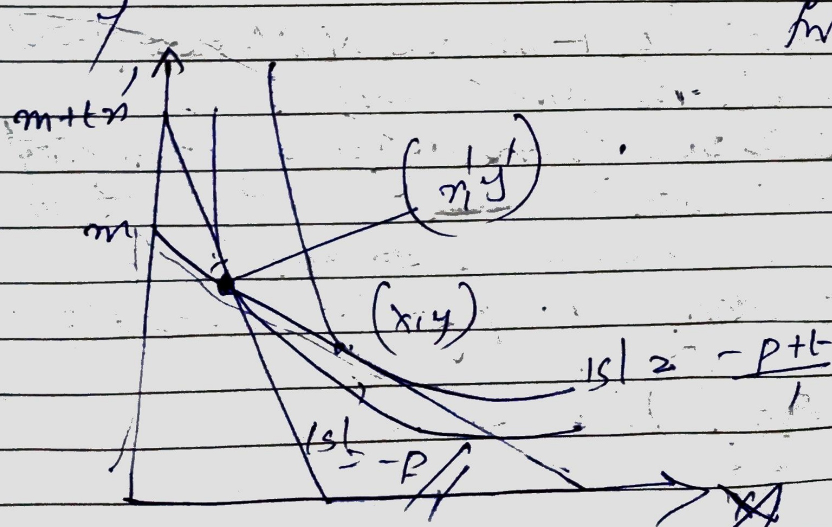
Budget line'll be $px + y = m$.

Remember that revenue $R = tx' = (p' - p)x'$.

With taxes
BL would be $(p+t)x + y' = m$.

But rebating the same amt of tax implies

BL'll be $(p+t)x' + y' = m + \underline{tx'}$.
Cancelling tx'
$\Rightarrow px' + y' = m$. (Read text pg 149-151 for detailed review)



Voluntary Real Time pricing (RTP) - Refer textb

Slutsky Identity

$\Delta x_1 = x_1(p_1', m) - x_1(p_1, m)$

This can be broken up into :-

$$\boxed{\Delta x_1 = \Delta x_1^s + \Delta x_1^n}$$

$$x_1(p_1', m) - x_1(p_1, m) = [x_1(p_1', m') - x_1(p_1, m)] + [x_1(p_1', m) - x_1(p_1', m')]$$

In words this eqn. says that total change in dd equals the SE and IE. This is the Slutsky Identity

Remember that substitution effect must always be -ve, opposite the change in price

However IE can go either way. IE'll be +vely related ~~with~~ ~~vos~~ in case of normal good. But in case of inferior goods it can be the other way

eg. |IE| > |SE| then it is a giffen good

Refer the dgm on pg. 145 (fig 8.3)
(IIIrd to Sem 1)

$$x(p_1', m) - x(p_1, m) = x(p_1', m') - x(p_1, m) + x(p_1', m) - x(p_1', m')$$

Rates of change :

$$\Delta x = \Delta x^s + \Delta x^n$$

$$\frac{\Delta x}{\Delta p_1} = \frac{\Delta x^s}{\Delta p_1} + \frac{\Delta x^n}{\Delta p_1} = \frac{\Delta x^s}{\Delta p_1} - \frac{\Delta x^n}{\Delta p_1},$$

Reversing RH_2 (new income − old income.

$$\Delta x^m = (-\Delta x^n).$$

m must be such that:

$$\Delta m = m' - m = (\Delta p_1) \cdot x_1 \; ;$$

ie it is just enough to buy the original bundle

Thus,

$$\boxed{\frac{\Delta x}{\Delta p_1} = \frac{\Delta x^s}{\Delta p_1} - \frac{\Delta x^m}{m' - m} \cdot x}$$

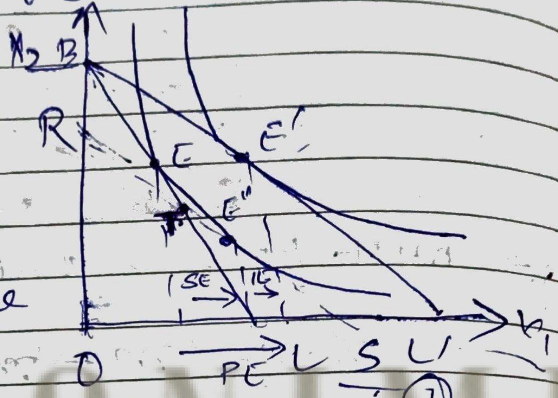
Hicks Substitution effect :

Instead of giving ~~him~~ the consumer an income that will make it suffice ~~to~~ buy the original bundle, Hicks SE is s that change in income. It be sufficient to purchase a bundle that is just indifferent to his original bundle.

Thus the Hicks subs effect keeps the utility constant rather than keeping purchasing power constant.

Despite the difference the net effect of SE'll be -ve.

Why E'' is to the right of E



as in OBL
E is the chosen bundle

i.e. E RP x ∈ RT   E > x ∈ RT (1)

Now with OBL'
E'' is the chosen bundle
and equilibrium would thus (since (1)) always lie to the right of E.

In OBL   E RP x ∈ RT
In OBL'   E'' RP x ∈ RT
⇒ In OBL   E RP E'' as well.

The Hicksian dd curve where utility is held constant is sometimes called the compensated dd curve. This arises as we think of constructing the Hicksian dd curve by adjusting income as the price changes so as to keep the consumer's utility const. Thus the consumer is "compensated" for price changes and his utility is same at every pt on the Hicksian dd curve.