08 June 2023

Decomposition of Price Effect
into → (1) Substitution Effect
(2) (Real) Income Effect

Whenever Price change (B rotates)
when M change B shifts

Price effect → effect of change in Price (P_1)↓ on demand of say x_1

PE = SE + IE

x_1, x_2
P_1↓ P_2 (const)
then $\frac{P_1}{P_2}$

P_1 falls → Household is better off → Income Effect
P_1 falls → Relative fall in price → Substitution effect

→ Consumer is better off (buy more)

m

A'C' shows same purchasing power as AB (m)

E

m↑ to m' and A'C' shifts parallelly to AC

AB: m, P_1, P_2 → AC (m, P_1', P_2)

m x_1 x_2
m' P_1 P_2

Slope changed
initial slope = $-\frac{P_1}{P_2}$ AB ← Initial budget
New: $-\frac{P_1'}{P_2}$

$P_1 \to P_1'$
$P_1' < P_1$

$m = P_1 x_1 + P_2 x_2$
slope of budget line
$$\frac{dx_2}{dx_1} = -\frac{P_1}{P_2} < 0$$

Suppose there is fall in price of x_1 that is say P_1'

AB → AC (for PE)

$$\left\{\begin{array}{l} AB \to m \\ A'C' \to m \\ AC \to m' \end{array}\right\} m < m'$$

m' is the money income

Let us suppose $\underline{m'}$ is the money income corresponding to A'C' which is just sufficient to make the original consumption bundle (x_1^*, x_2^*) affordable at new price P_1'

$P_1 \nearrow$ E

Since it is affordable at both (P_1, P_2, m) and (P_1', P_2, m')

AB — A'C'

E — A'C' — ||lel — AC

$$m' = P_1' x_1 + P_2 x_2$$

$$m = P_1 x_1 + P_2 x_2$$

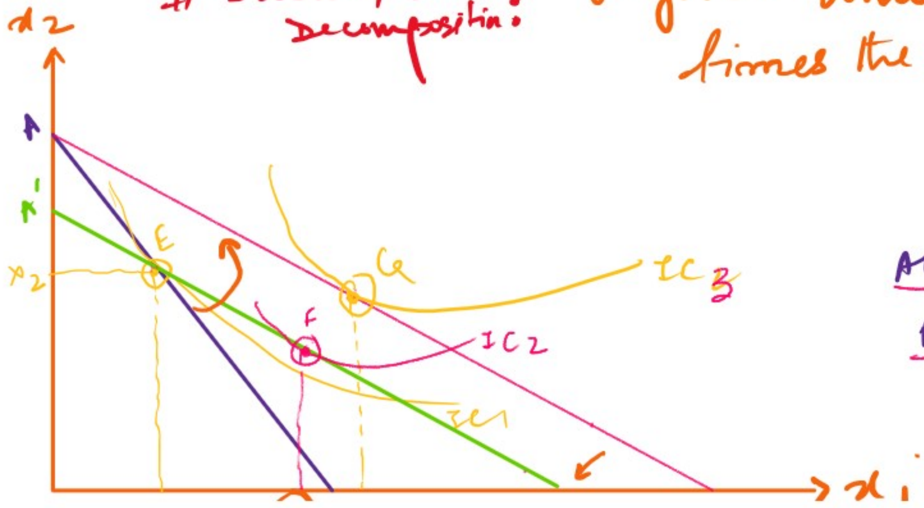
$$m' - m = x_1 [P_1' - P_1]$$

$$\text{or, } \Delta m = x_1 \Delta P_1 \quad \text{—— (1)}$$

absolute change in income

{change in '$\underline{m}$' required to make the original bundle (E) affordable at the new price ratio $\frac{P_1'}{P_2}$ is the original amount of x_1 times the change in P_1 (ΔP_1)}

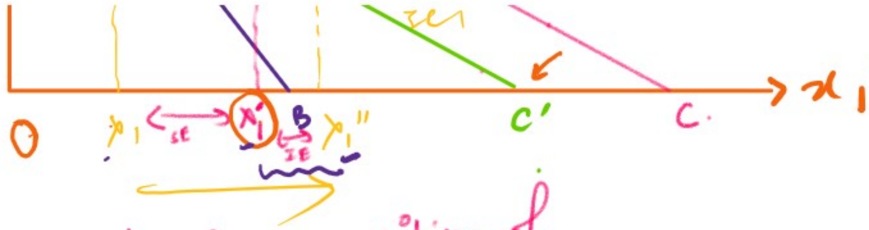
Slutsky's Decomposition:



AB → (P_1, P_2, m) → A'C'

AC → (P_1', P_2, m) (P_1', P_2, m')

movement from (E to G)



movement from
(E to G)
(Price effect)

SE (movement from E to F due to fall in P_1)

IE (movement from F to G due to increase in income from m to m')

Slutsky's decomposition of price effect into
Income effect and
Substitution effect.

Substitution effect $\Delta x_1^s \Rightarrow$ change in demand for x_1 when P_1 changes to P_1', and money is at m'.

$$\Delta x_1^s = x_1(P_1', m_1') - x_1(P_1, m)$$
$$OX_1' \quad - \quad OX_1$$

(1)

Income effect, $\Delta x_1^m \Rightarrow$ change in demand for x_1 when consumer's income changes from m to m'. at fixed price P_1'

$$\Delta x_1^m = x_1(P_1', m) - x_1(P_1', m')$$
$$x_1' x_1'' = OX_1'' - OX_1'$$

(2)

Price effect as the sum of SE and IE.

Total change in demand $\Delta x_1 \Rightarrow$ change in x_1 due to change in P_1 holding 'm' const.

$$\Delta x_1 = \underbrace{x_1(P_1', m) - x_1(P_1, m)}_{(3)}$$

We know, $\Delta x_1 = \Delta x_1^s + \Delta x_1^m$

$$\Rightarrow \underbrace{x_1(P_1', m) - x_1(P_1, m)}^{PE} = \overbrace{\left[x_1(P_1', m') - x_1(P_1, m)\right]}^{SE} + \underbrace{\left[x_1(P_1', m) - x_1(P_1', m')\right]}_{IE}$$

This is known as the Slutsky Identity.