

### Chapter 14 Substitution and Income Effects

When price  $p_x$  changes, the consumer adjusts both the consumption of  $x$  and  $y$ . These adjustments of the quantities consumed can be broken down into two parts:

- 1. Substitution Effect
- 2. Income Effect

This is because when price  $p_x$  decreases, it causes two changes:

- a) relative price— $x$  becomes relatively cheaper
- b) real income—consumer feels richer when price  $p_x$  decreases.

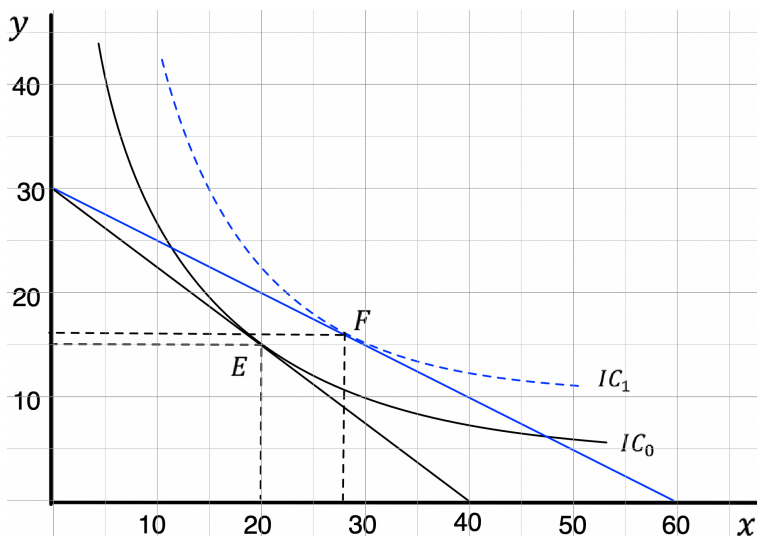
**Substitution Effect** = Changes of consumption of  $x$  and  $y$  as a result of the change in the relative price while keeping real income constant.

**Income Effect** = Changes of consumption of  $x$  and  $y$  as a result of the change in the real income with new relative price.

- To determine the Substitution Effect, we have to keep real income constant.
- Real income constant  $\Leftrightarrow$  Same satisfaction level  
 $\Leftrightarrow$  Stay on same Indifference Curve

**Substitution Effect and Income Effect** There are 4 possible cases:

- 1.  $p_x$  decreases from  $p_x = 3$  to  $p'_x = 2$ .



- The equilibrium point changes from  $E = (x_0, y_0)$  to  $F = (x_2, y_2)$ . In this case, when  $p_x$  decreases, the consumer buys more of  $y$ . This means  $x$  and  $y$  are complementary.
- The relative price changes from  $\frac{p_x}{p_y} =$  to  $\frac{p'_x}{p_y} =$
- To keep the same satisfaction with the new relative price  $\frac{p'_x}{p_y}$  draw an **imaginary budget line** with slope  $\frac{p'_x}{p_y}$  to be tangent with the original Indifference Curve  $IC_0$ .
- The Substitution Effect is:

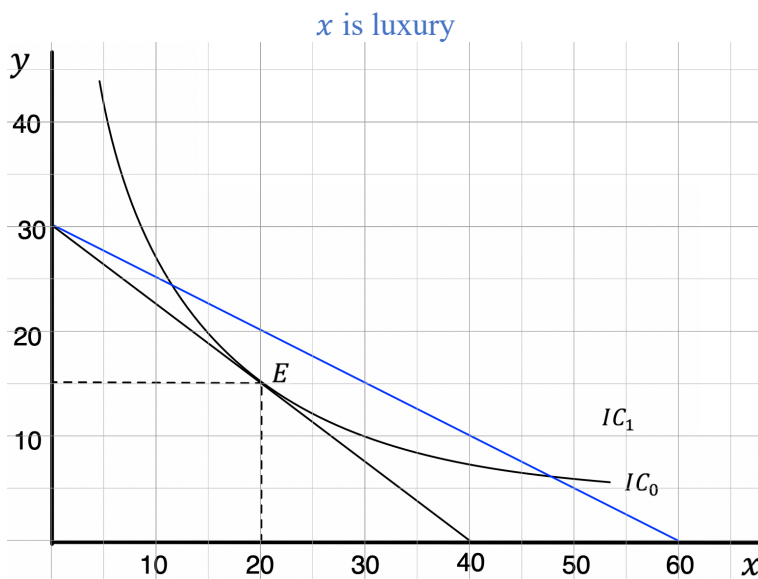
$$S.E. = \begin{cases} \Delta x = x_1 - x_0 = > 0 \\ \Delta y = y_1 - y_0 = < 0 \end{cases}$$

- When price changes in such a way that  $x$  is relatively less expensive, the Substitution Effect is always such that  $\Delta x > 0$  and  $\Delta y < 0$ . Why?
- Income Effect can be found by moving the imaginary budget line to be tangent with the new budget line.

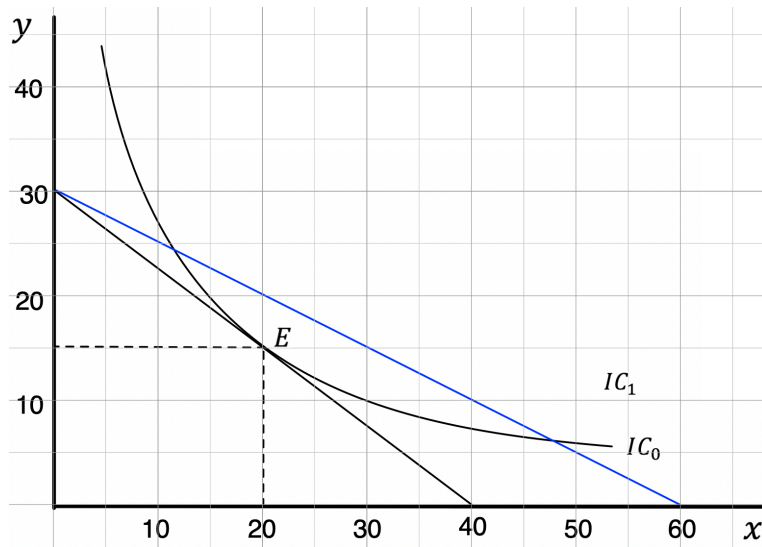
$$I.E. = \begin{cases} \Delta x = x_2 - x_1 = \\ \Delta y = y_2 - y_1 = \end{cases}$$

- According to the resulting  $I.E.$ ,  $x$  and  $y$  are normal goods because as the real income increases, the consumer consumes more of both  $x$  and  $y$ .
- **Total Effect** =  $T.E. = S.E. + I.E.$   

$$= \begin{cases} \Delta x = (x_1 - x_0) + (x_2 - x_1) = x_2 - x_0 \\ \Delta y = (y_1 - y_0) + (y_2 - y_1) = y_2 - y_0 \end{cases}$$
- In the following graphs, draw  $IC_1$  in such a way that  $x$  is luxury and inferior.

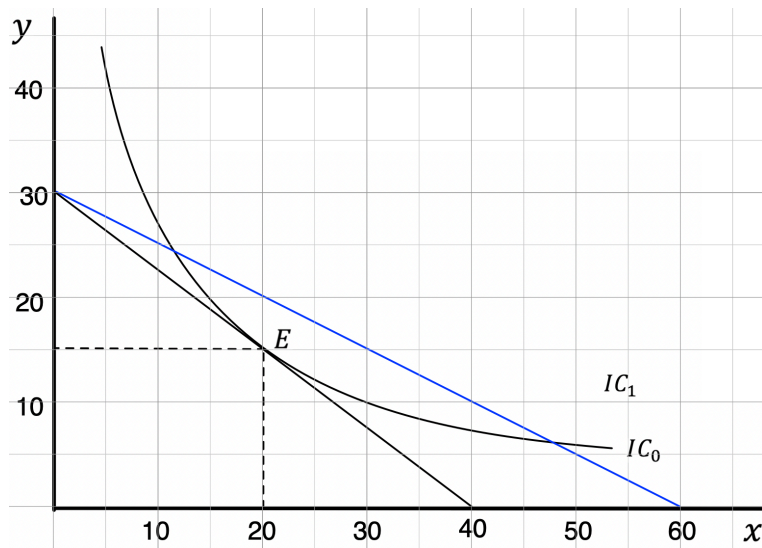


$x$  is inferior



- Can  $x$  be so inferior such that when the price  $p_x$  decreases, the consumer buys less of  $x$ ?

$x$  is Giffen good



- This means that when price  $p_x$  decreases, the consumer ends up buying less of  $x$ . Thus, this violates the Law of Demand even when the consumer is being rational.