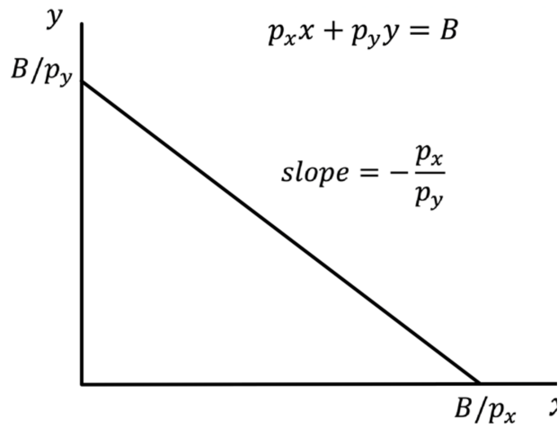
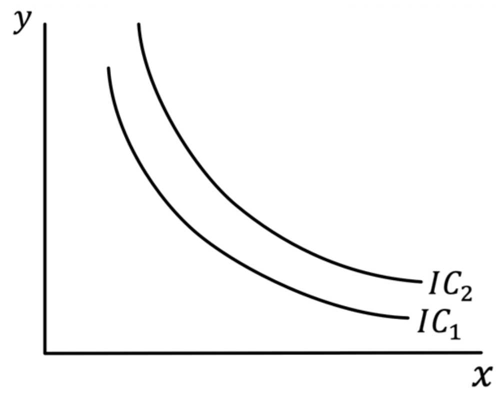
Chapter 13 Income and Price Consumption Curves

Changes of Consumption Equilibrium can be caused by the change in

1. Income
2. Price of a good

- Only one change at a time and Indifference Curves are assumed to be unchanged.

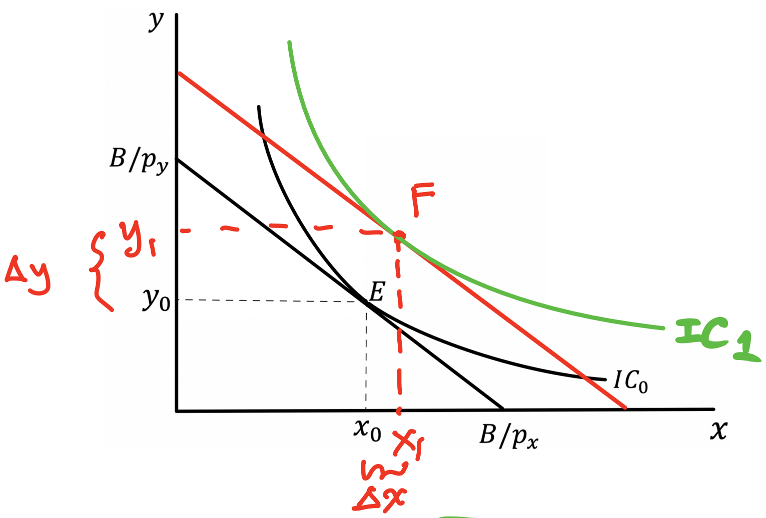




1. Change in Income (Budget) The original equilibrium is at $E = (x_0, y_0)$ where the budget line is tangent to IC_0, with equilibrium conditions:

at E

1) $p_x x_0 + p_y y_0 = B$
2) $\frac{MU_x(x_0,y_0)}{MU_y(x_0,y_0)} = \frac{p_x}{p_y}$.



Budget increases from B to B'.

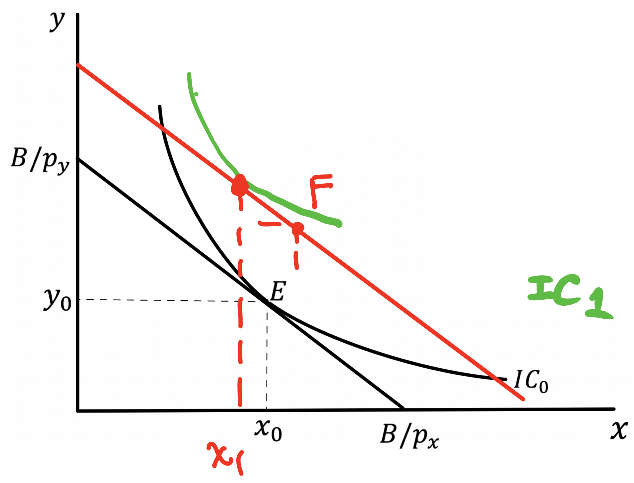
- New equilibrium is at $F = (x_1, y_1)$ where we have the equilibrium conditions:

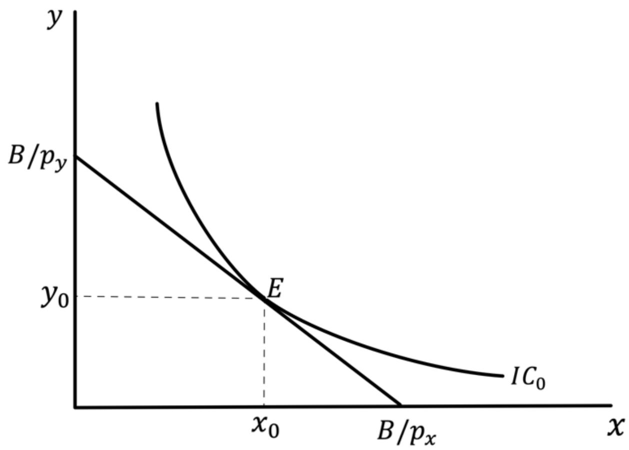
1) $p_x x_1 + p_y y_1 = B' \Leftrightarrow F = (x_1, y_1)$ is affordable,
2) $\frac{MU_x(x_1,y_1)}{MU_y(x_1,y_1)} = \frac{p_x}{p_y}$

- When income increases, the consumer consumes more of $x = \Delta x = x_1 - x_0 > 0$ and more of $y = \Delta y = y_1 - y_0 > 0$
- Thus both x and y are ***normal goods***.
- When budget increases, we can have other different results:

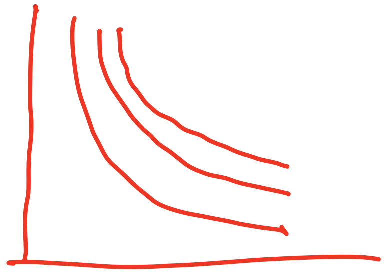
Normal	Inferior
$\eta_I \geq 0$	$\eta_I < 0$

Necessary	Luxury
$0 \leq \eta_I \leq 1$	$\eta_I > 1$

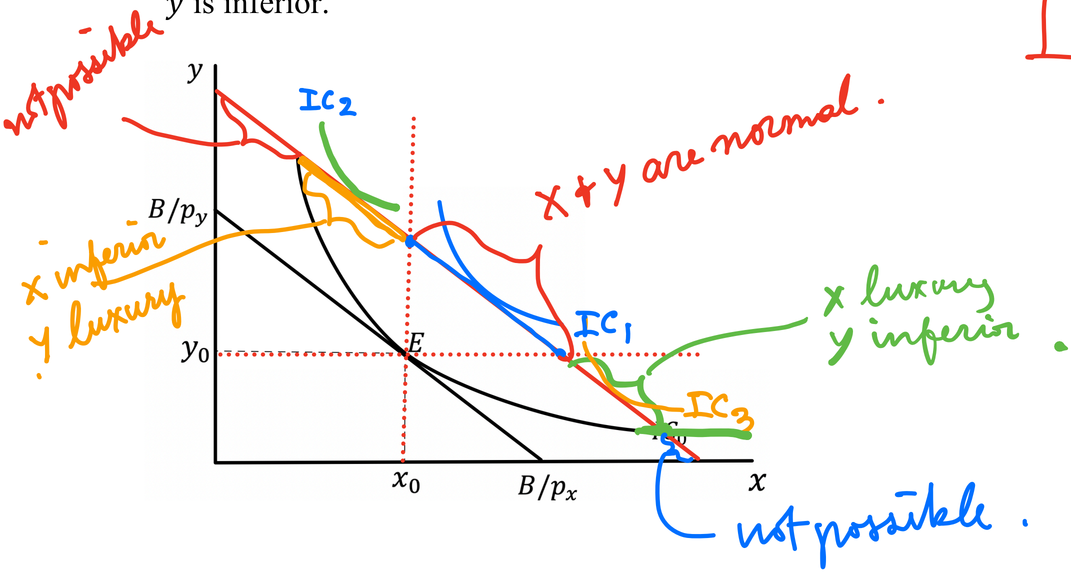




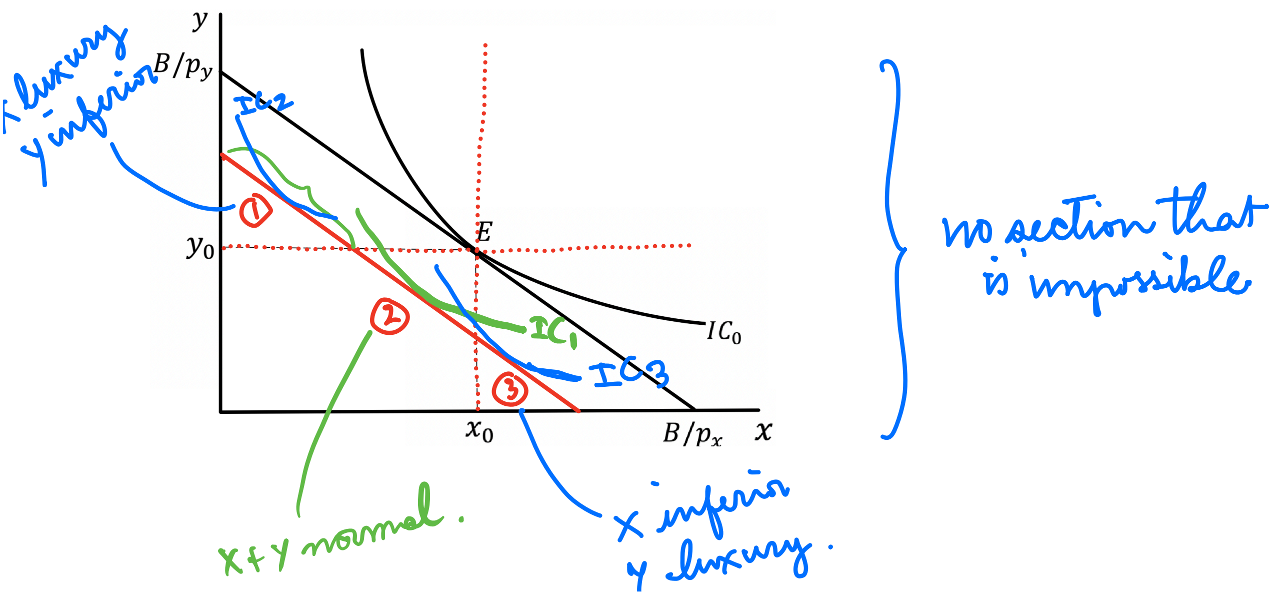
x is inferior $\eta_I^x < 0$
y is luxury $\eta_I^y \geq 0$



- When budget increases, we can separate the new budget lines into sections that both are normal, x is inferior and y is inferior.



When budget B **decreases** from B to B', we can separate the new budget lines into sections that both are normal, x is inferior and y is inferior.



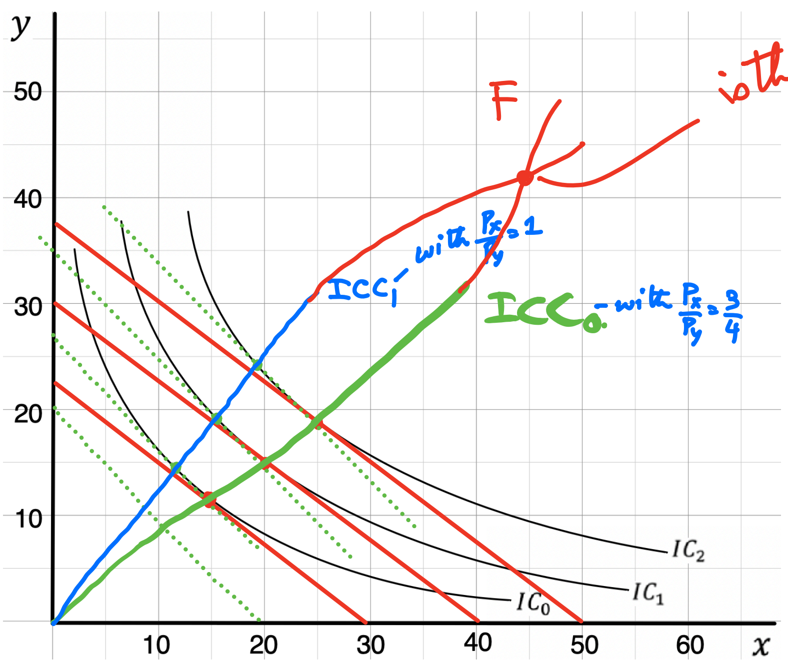
Income Consumption Curve (ICC) is a line whose every point is a consumption equilibrium for a given income level at given fixed prices of p_x and p_y.

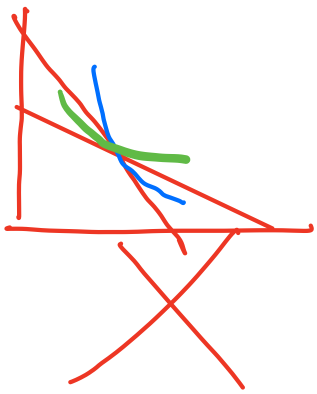
- With given $p_x = 3$ and $p_y = 4$, the budget line is given by

$$3x + 4y = B$$

- We have the following equilibria at various level of incomes (budgets), $B = 90, 120, 150, etc.$

is the eq. of 2 diff relative prices.





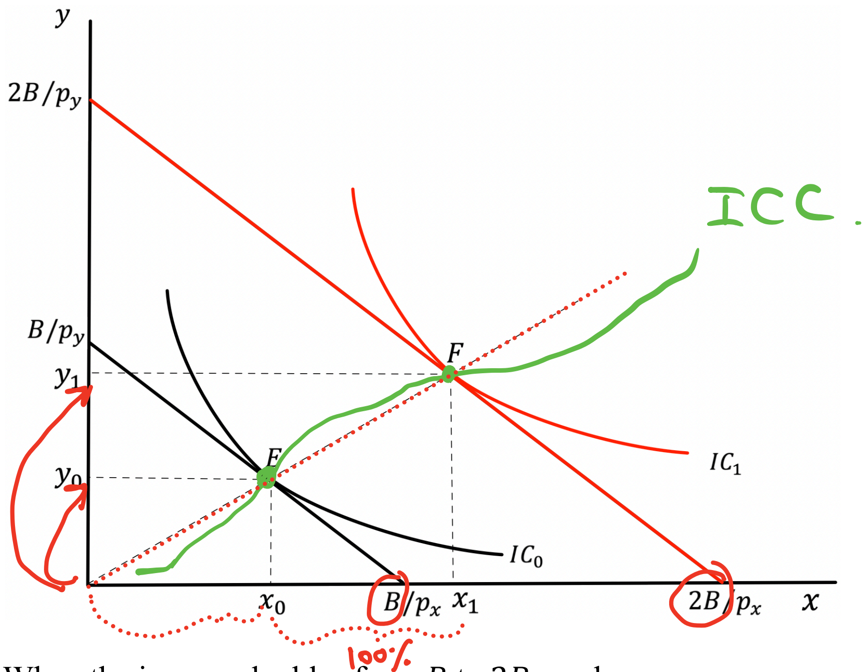
- When the budget keeps getting smaller and smaller, does the ICC ~~goes~~ go to the origin?
- ICC does not change when the prices $p_x = 3$ and $p_y = 4$ changes to $p_x = 30$ and $p_y = 40$. — same slope of budget line $\Rightarrow$ same ICC.
- How does the ICC changes when the prices become $p_x = 3$ and $p_y = 3$. — $-\frac{P_x}{P_y} = -\frac{3}{3} = -1$

Properties of ICC

1. For a given p_x and p_y, the ICC always passes through the origin.
2. If we have the same relative price $\frac{p_x}{p_y}$, we have the same ICC.
3. If we have different relative prices, we have different ICC's. Higher relative price $\frac{p_x}{p_y}$ will give a higher ICC. — ICC_1 is above ICC_0
4. Two ICC's cannot intersect or be tangent to each other.

Any two points on a given ICC can give the income elasticities of x and y.

Let assume that we have two equilibrium points E and F being on a same ICC that line up on a straight line through the origin. For ease of exposition, assume that E is on a budget line with income B, while F is on a budget line with the income $2B$.



When the income doubles from B to $2B$, we have

$$\%\Delta I = 100\%$$

By simple geometry of similar triangles, the consumption of x increases from x_0 to $x_1 = 2x_0$. We have

$$\%\Delta Q_x = 100\%$$

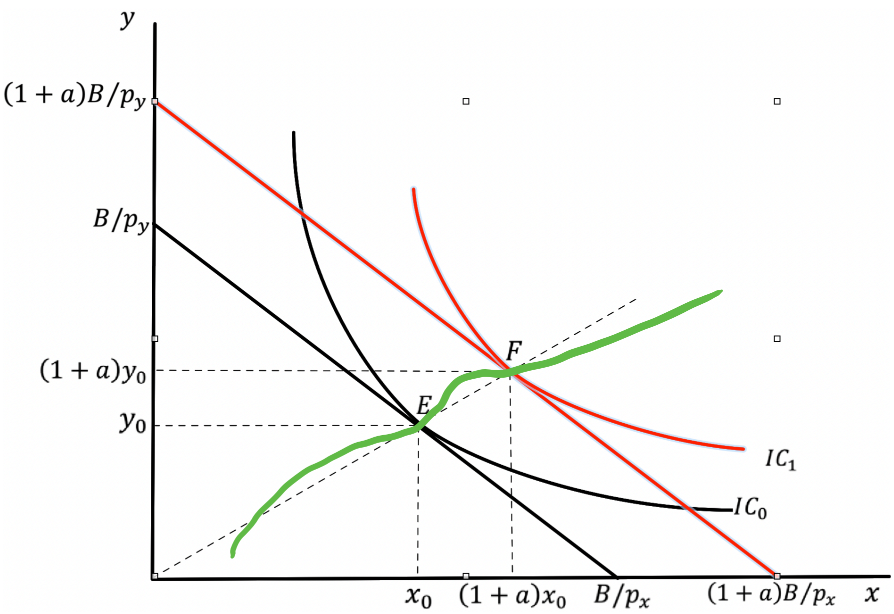
Thus, the income elasticity of product x is

$$\eta_I^x = \frac{\%\Delta Q_x}{\%\Delta I} = \frac{100\%}{100\%} = 1.$$

By the same reasoning, we also have $\%\Delta Q_y = 100\%$ and

$$\eta_I^y = \frac{\%\Delta Q_y}{\%\Delta I} = \frac{100\%}{100\%} = 1.$$

This is true even when income increases by any fraction a, from B to $(1 + a)B$ income increases $\%\Delta I = a100\%$. If E and F are on the straight line passing through the origin

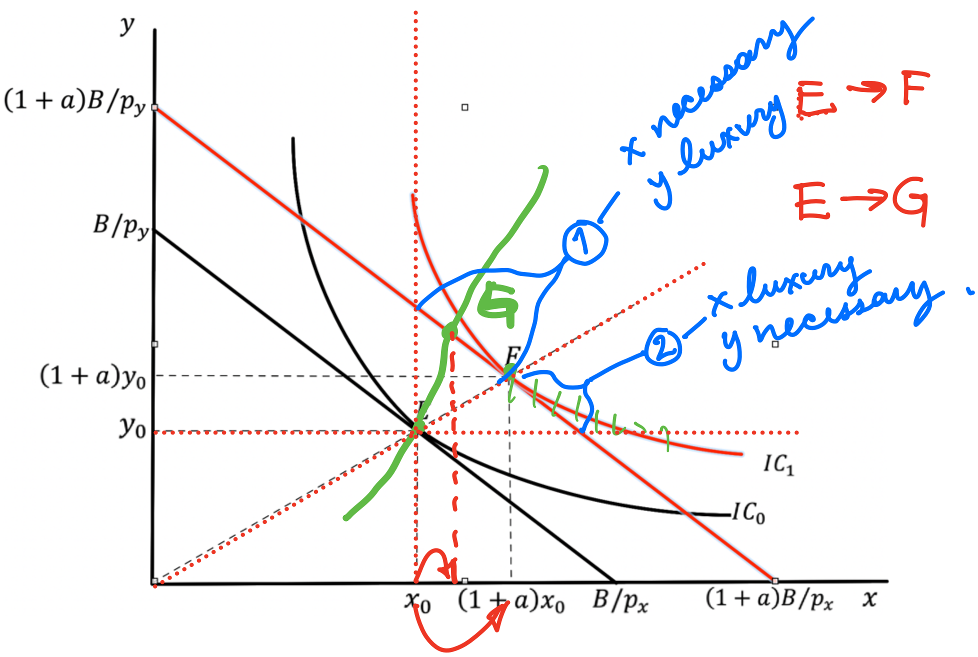


a = 0.2

we also have $\%\Delta Q_x = a100\%$, $\%\Delta Q_y = a100\%$, and

$$\eta_I^x = \frac{\%\Delta Q_x}{\%\Delta I} = \frac{a100\%}{a100\%} = 1$$
$$\eta_I^y = \frac{\%\Delta Q_y}{\%\Delta I} = \frac{a100\%}{a100\%} = 1.$$

- When income ***increases***, the new budget line can be divided into sections that
   1. x is luxury $\eta_I^x > 1$ and y is necessary $0 \le \eta_I^y < 1$
   2. x is necessary $0 \le \eta_I^x < 1$and y is luxury $\eta_I^y > 1$
   3. x is inferior $\eta_I^x < 0$ and y is
   4. y is inferior $\eta_I^y < 0$ and x is



E → F $\eta_I^x = 1, \eta_I^y = 1$

E → G $\eta_I^x < 1, \eta_I^y > 1$

- When income ***decreases***, the new budget line can be divided into sections that
  1. x is luxury $\eta_I^x > 1$ and y is necessary $0 \le \eta_I^y < 1$
  2. x is necessary $0 \le \eta_I^x < 1$and y is luxury $\eta_I^y > 1$
  3. x is inferior $\eta_I^x < 0$ and y is
  4. y is inferior $\eta_I^y < 0$ and x is

·from F to E, $\eta_I^x = 1$, $\eta_I^y = 1$

F to G $\eta_I^x > 1$, $\eta_I^y < 1$

x luxury, y necessary