PLAN FOR NEXT CLASSES

I – PROD. FUNCTIONS

II – PPF / BOX

III – COMP. EQUIL. CLOSED ECONOMY

IV – RELATIVE SUPPLY / DEMAND

V – EXCESS DEMAND
IMPORT SUPPLY / DEMAND] SECTION

VI – COMP. EQUIL. OPEN ECONOMY:

~~[illegible]~~

- SMALL OPEN ECONOMY

VII 2 COUNTRY WORLD EQUILIBRIUM

1-25-11

I- PROD. FUNCTIONS

RICARDO: ONE INPUT, LINEAR PROD. FUNCTION

$$q = \underset{\substack{\downarrow \\ \text{POSITIVE CONSTANT}}}{B} \cdot \underset{\downarrow \text{LABOR}}{L} \Rightarrow APL = MPL = B$$

UNIT LABOR COEFF: $\frac{1}{B}$ = # UNITS L NEEDED TO PRODUCE 1 UNIT OF OUTPUT

$= \underset{\downarrow \text{NOTATION}}{a}$

STANDARD PROD. FUNCTIONS USED IN MOST MODELS

2 FACTORS: L, K

MOST CASES: 2 GOODS: X, Y

$$X = f_X(L_X, K_X)$$

$$Y = f_Y(L_Y, K_Y)$$

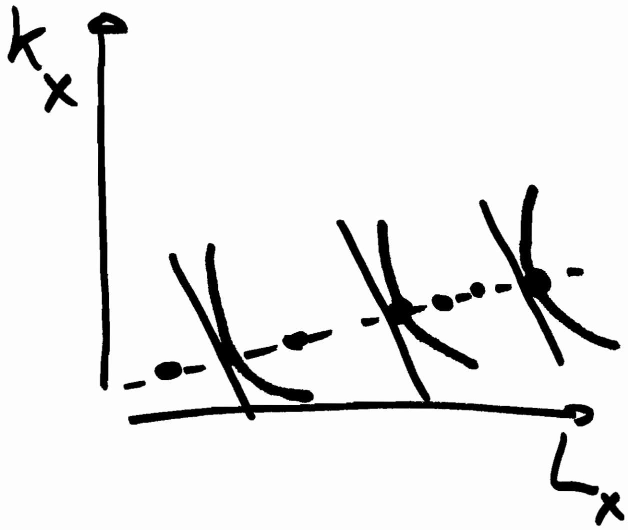
TYPICAL ASSUMPTIONS:

- $\downarrow$ MPL, $\downarrow$ MPK
- CRS

- f_X & f_Y HAVE ≠ FACTOR INTENSITY (DETAILS LATER)
- "LINEAR EXPANSION PATH"

COST MINI. INPUT RATIO DEPENDS ONLY ON INPUT PRICE RATIOS. (i.e. THEY DO NOT CHANGE WITH OUTPUT LEVEL)

EX: w = WAGE , r = RENTAL PRICE OF K

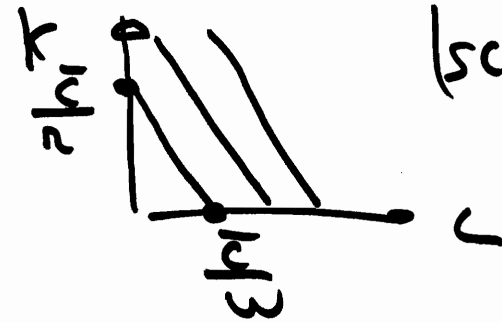


HERE: X : L- INTENSIVE
Y : K- INTENSIVE

FOR ANY w, r: $\dfrac{K_X}{L_X} < \dfrac{K_Y}{L_Y}$

REMARK: ISOCOST:

$$\bar{C} = w \cdot L + r \cdot K$$

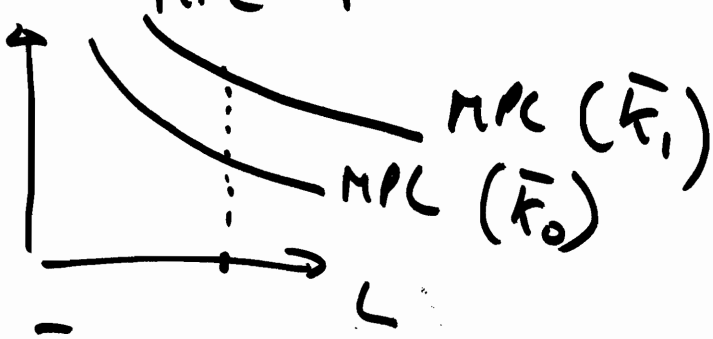


$|\text{SLOPE}| = \dfrac{w}{r}$

- MPL & MPK ARE FUNCTION OF THE INPUT RATIO (ONLY! $\Rightarrow$ THEY DO NOT DEPEND ON OUTPUT LEVEL).

$$\uparrow \frac{K}{L} \Longrightarrow \begin{array}{l} MPK \downarrow \\ MPL \uparrow \end{array}$$

Ex:



$\bar{K}_0 < \bar{K}_1$

REMARK: COBB DOUGLASS PROD. FUNCTION SATISFIES ALL ASSUMPTIONS. (ASSUMING EXPONENTS ADD TO 1)

$$q = f(L, K) = L^{\alpha} \cdot K^{1-\alpha}$$

$$0 < \alpha < 1$$

$$MPL = \alpha L^{\alpha-1} K^{1-\alpha} = \alpha \frac{K^{1-\alpha}}{L^{1-\alpha}} = \boxed{\alpha \left(\frac{K}{L}\right)^{1-\alpha}}$$

$$MPK = (1-\alpha) K^{-\alpha} L^{\alpha} = (1-\alpha)\left(\frac{L}{K}\right)^{\alpha}$$

SHOW CMS (SECTION).

II - PPF / BOX (2 GOODS / 2 INPUTS)

PPF: COMBINATIONS X, Y SUCH THAT:

$$X = f_X(L_X, K_X) \text{ IS MAXIMIZED}$$

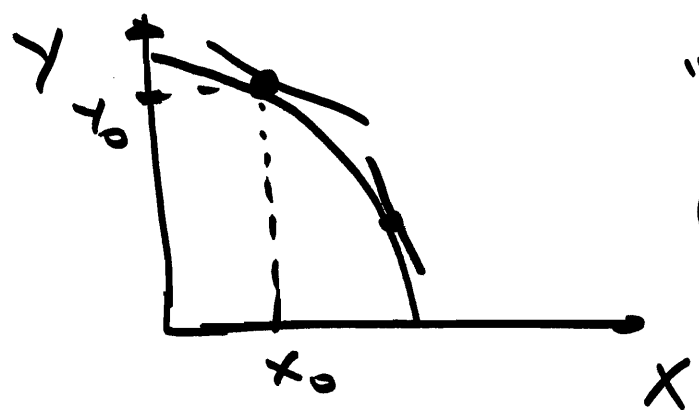
SUBJECT TO

$$\bar{Y} = f_Y(L_Y, K_Y)$$

& FEASIBILITY

$$\begin{cases} \bar{L} = L_X + L_Y \\ \bar{K} = K_X + K_Y \end{cases}$$

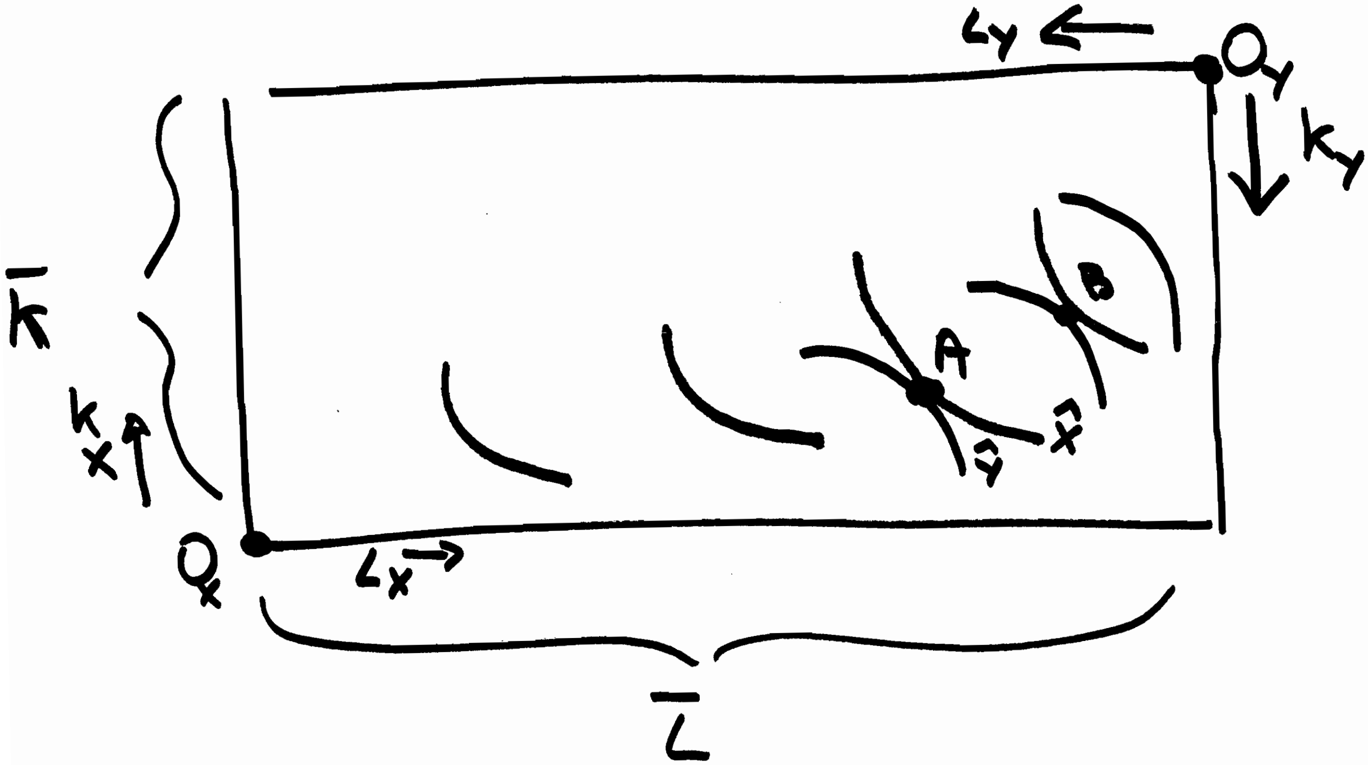
WHERE $\bar{L}, \bar{K}$ ARE LABOR & CAPITAL ENDOWMENT OF THE COUNTRY.

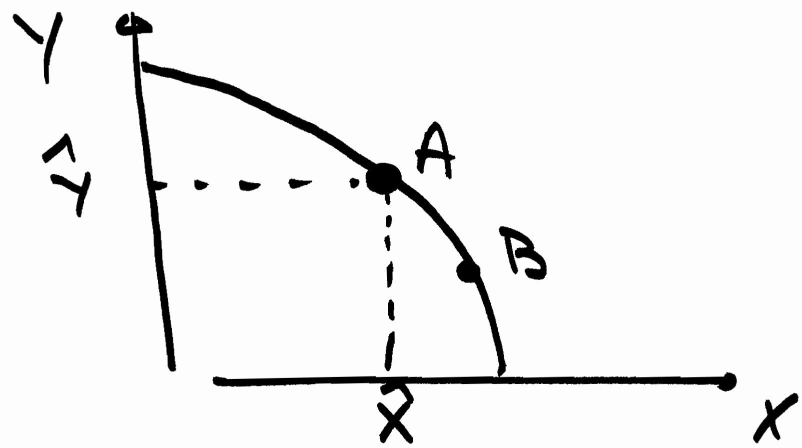


"STANDARD SHAPE" (EX: COBB DOUGLAS)

$$|\text{SLOPE PPF}| = \frac{\Delta Y}{\Delta X}$$

BOX : SIZE OF ENDOWMENT

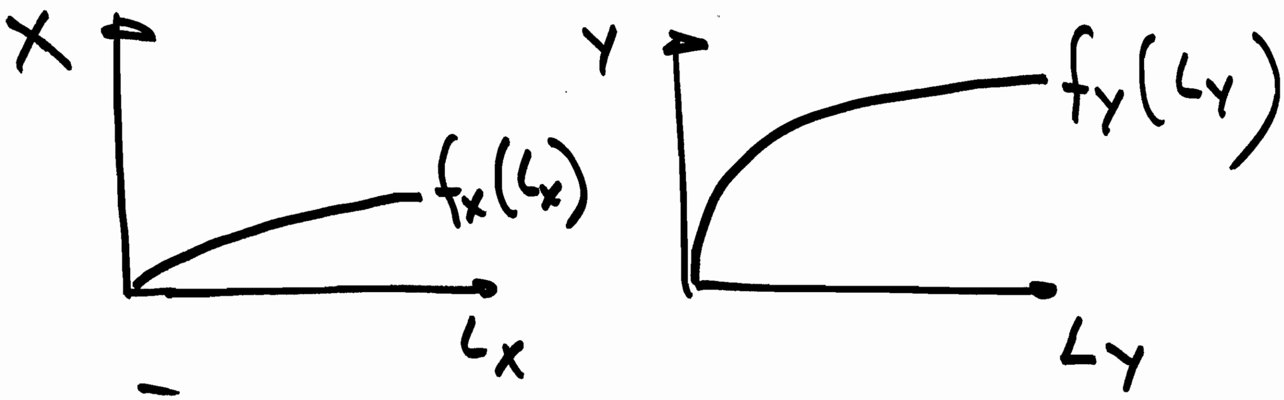




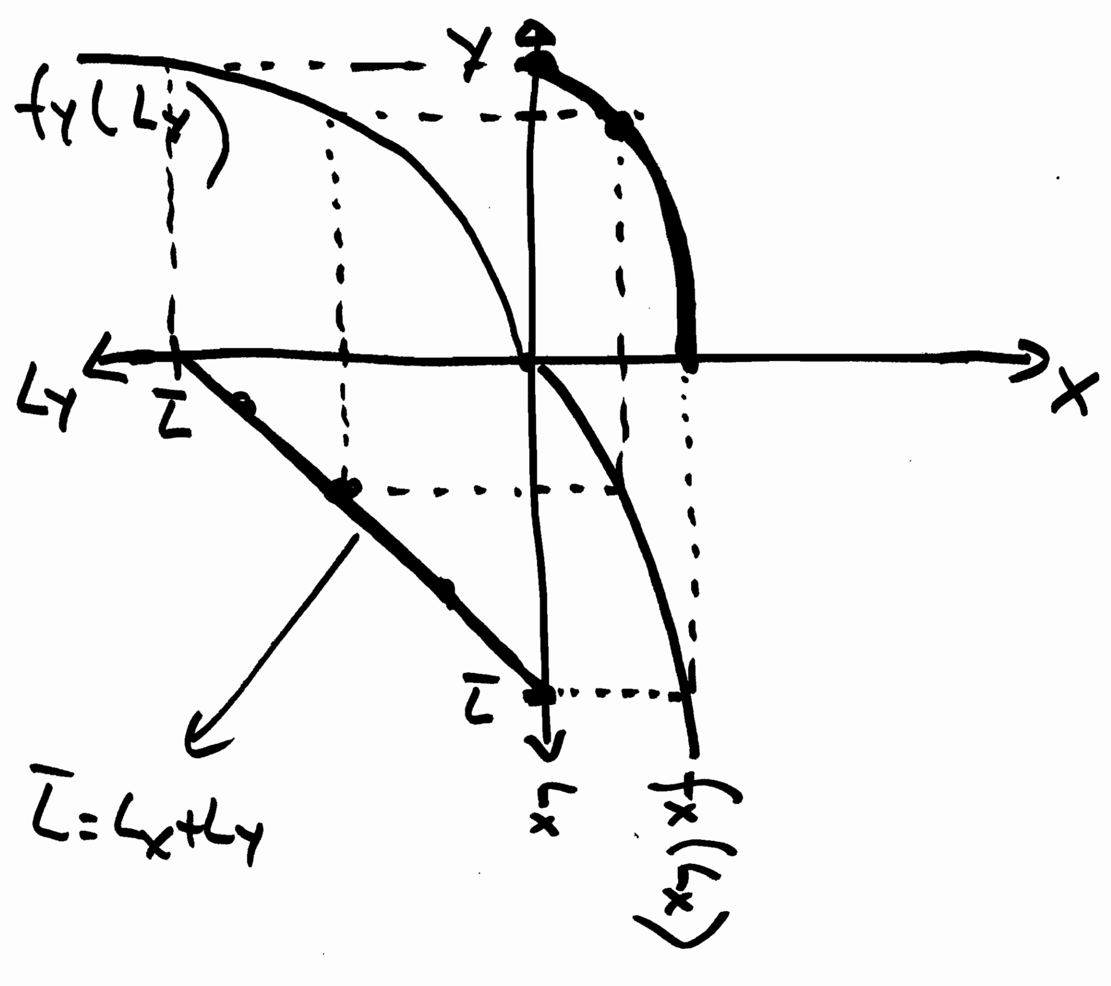
EXAMPLE OF PPF WITH ONLY 1 INPUT (LABOR) & $\downarrow$ MPL IN BOTH SECTORS.

2 GOODS: X, Y

1 INPUT: L



$\bar{L}$ = LABOR ENDOWMENT



1-27-11

(III) CE CLOSED ECONOMY

<u>DEFINITION</u>: $\left(\frac{p_X}{p_Y}\right)$ AND (w, r)

SUCH THAT

(1) CONS. MAX. UTILITY SUBJECT TO THE "RELEVANT BUDGET CONSTRAINT"

(2) PROFIT MAX. OF FIRMS

(3) MARKET CLEARING (OUTPUTS, INPUTS)

$\Longrightarrow$

CONDITIONS

(1) BUDGET CONSTRAINT SATISFIED

& |SLOPE INDIF. CURVE| = |SLOPE BUDGET CONSTRAINT|

(2) VALUE OF MARGINAL PRODUCT = INPUT PRICE

$\Longrightarrow$

$$\boxed{MPL_X \cdot p_X = w = MPL_Y \cdot p_Y}$$

$$MPK_X \cdot p_X = r = MPK_Y \cdot p_Y$$

USING THIS + EQUIL. CONDITIONS IN LABOR/ CAPITAL MARKET

$$\Longrightarrow \quad \frac{p_X}{p_Y} = \frac{MPL_Y}{MPL_X} = \frac{\frac{\Delta Y}{\Delta L_Y}}{\frac{\Delta X}{\Delta L_X}}$$

ALONG PPF ~~(ON EN~~

FEASIBILITY $\Rightarrow$ $\Delta L_Y = -\Delta L_X$

$\downarrow \bar{L} = L_X + L_Y$

$$\Rightarrow \boxed{\frac{p_X}{p_Y}} = \frac{\frac{\Delta Y}{\Delta L_Y}}{\frac{\Delta X}{\Delta L_X}} = \boxed{-\frac{\Delta Y}{\Delta X}}$$

$\downarrow$

|SLOPE PPF|

(3) MARKET CLEARING :

X, Y SUPPLY & DEMAND NEED TO MATCH

(PRODUCTION AND CONSUMPTION POINT MATCH)

$$X^P = X^C$$

$$Y^P = Y^C$$

INPUTS:

$$\bar{L} = L_X(\,) + L_Y(\,)$$

$$\bar{K} = K_X(\,) + K_Y(\,)$$

REMARKS:

AGENTS, # FIRMS, COUNTRY

COUNTRY: - AGENTS WITH PREF. & ENDOWMENTS
- TECHNOLOGY

WE ASSUME ALL AGENTS ARE IDENTICAL & HAVE "NICE" PREFERENCES

↓ "NICE" INDIFF. CURVES WITH LINEAR EXPANSION PATHS

BECAUSE CRS TECHNOLOGY: # OF FIRMS DOES NOT MATTER.

SIMPLIFIED PICTURE: SINGLE AGENT

ALTERNATIVE: COMMUNITY INDIF. CURVES.

GRAPHICAL : SINGLE AGENT

REMEMBER CRS:

VALUE OF PRODUCTION = FACTOR COMPENSATION

$$\underbrace{\boxed{X^P \cdot p_X + Y^P \cdot p_Y}}_{\text{TOTAL REVENUE}} = \underbrace{w \cdot \bar{L} + r \cdot \bar{K}}$$

TOTAL REVENUE OF FIRM THAT PRODUCES (OR CAN PRODUCE) X & Y

IN THIS CASE :

PROFITS: TOTAL REVENUE − "TOTAL COST" $\underbrace{}_{w \cdot \bar{L} + r \cdot \bar{K}}$

TAKING p_X, p_Y, w, r AS GIVEN TOTAL COST IS INDEPENDENT OF X^P, Y^P

⟹ PROFIT MAX IS EQUIVALENT TO REVENUE MAXIMIZATION

DEFINITION: "ISOVALUE LINE"
COMBINATIONS OF X^P & Y^P THAT GIVE THE SAME TOTAL REVENUE :

$$\bar{V} = p_x \cdot X^p + p_y \cdot Y^p$$

FIXED NUMBER

CONSTANTS TAKEN AS GIVEN

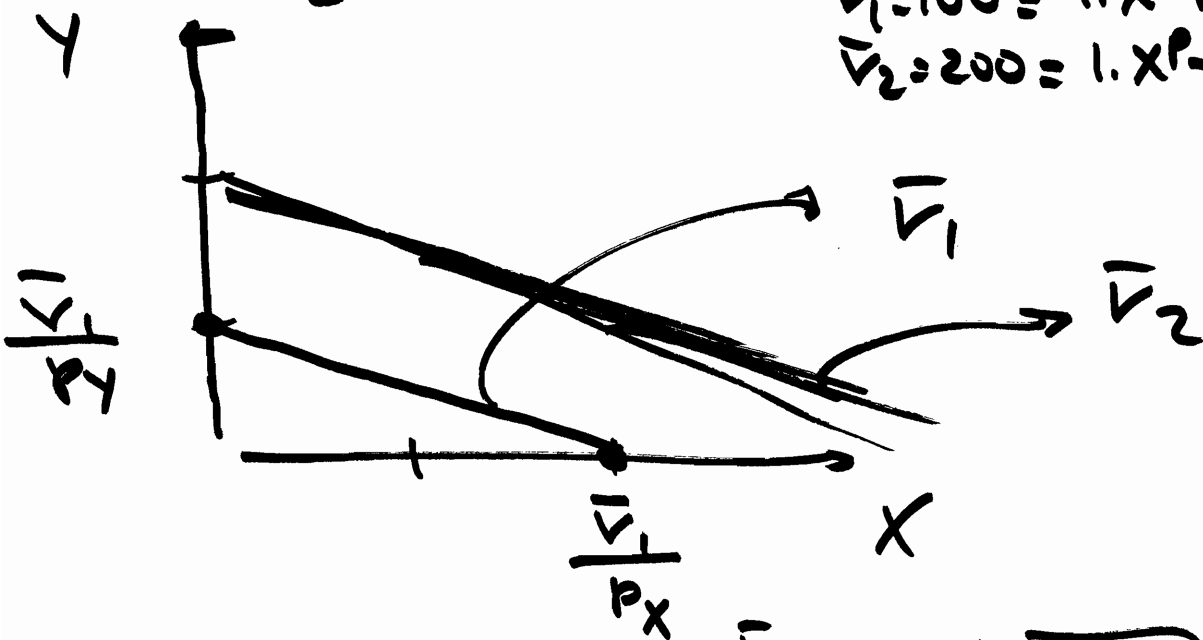
EX:

$\bar{V}_1 = 100$, $p_x = 1$ $p_Y = 2$

$\bar{V}_2 = 200$

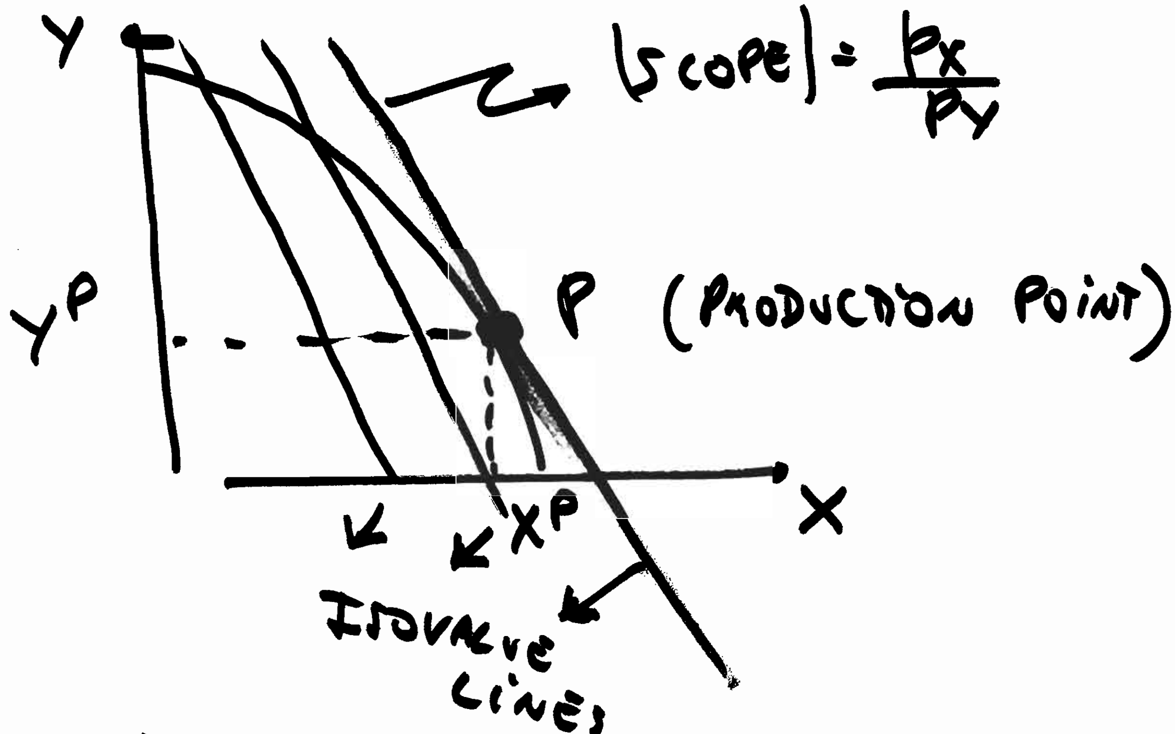
$\bar{V}_1 = 100 = 1 . X^p + 2 . Y^p$

$\bar{V}_2 = 200 = 1 . X^p + 2 . Y^p$



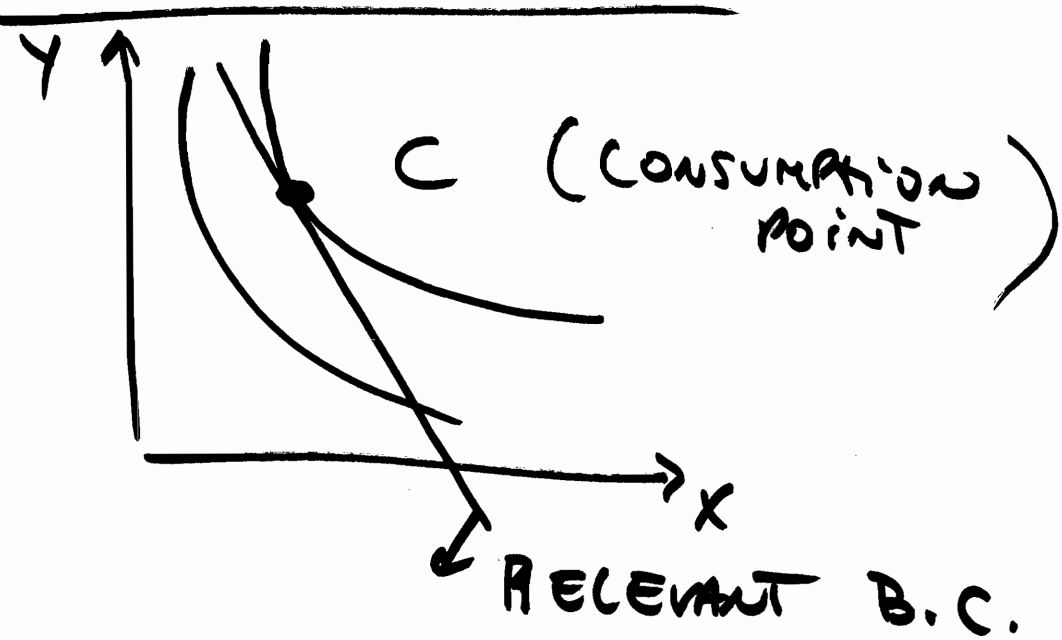
$$|\text{SLOPE}| = \frac{\frac{\bar{V}_1}{p_Y}}{\frac{\bar{V}_1}{p_X}} = \boxed{\frac{p_X}{p_Y}}$$

PROFIT MAX ⟹
REVENUE MAX ⟹
X^P, Y^P SUCH THAT
ON PPF & HIGHEST
ISOVALUE LINE



REMARK:
"RELEVANT BUDGET CONSTRAINT"
= ISOVALUE THAT GOES THROUGH
PRODUCTION POINT.

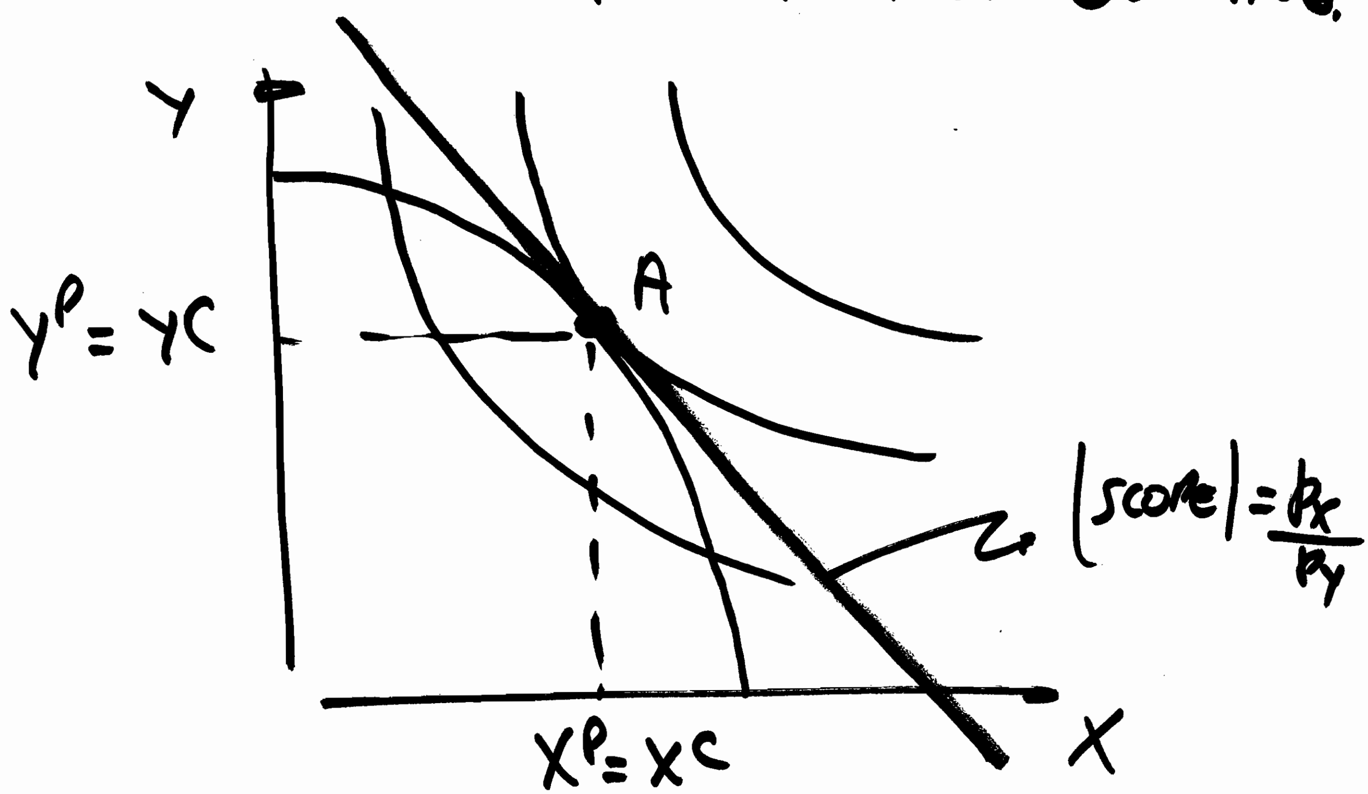
CONSUMPTION PROBLEM



FOR EQUILIBRIUM IN CLOSED ECONOMY NEED:

$$X^P = X^C$$
$$Y^P = Y^C$$

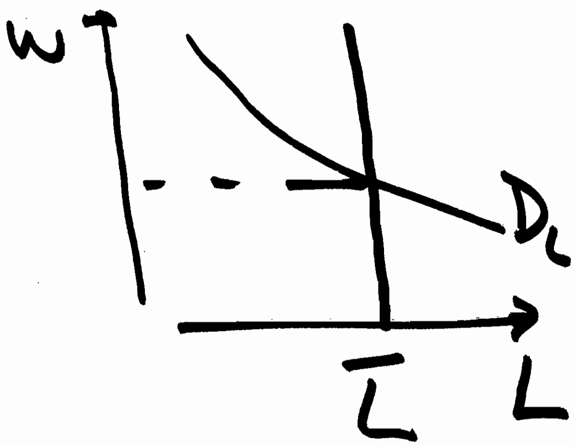
+ INPUT MKT CLEARING.

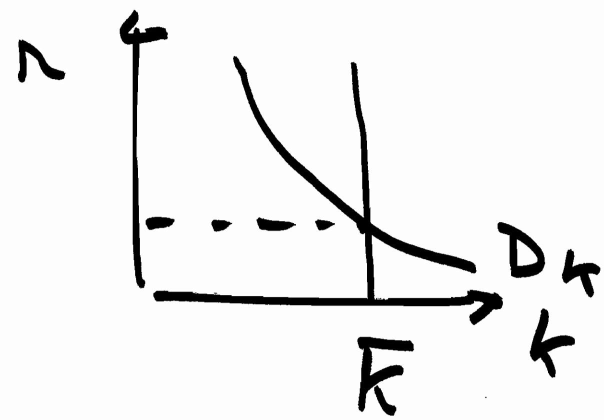


FACTOR MARKETS

INELASTIC SUPPLY

DEMAND: AGG. FROM BOTH SECTORS





D_L DERIVED FROM:

$$MPL_X \cdot p_X = MPL_Y \cdot p_Y = w$$

D_K DERIVED FROM:

$$MPK_X \cdot p_X = MPK_Y \cdot p_Y = r$$

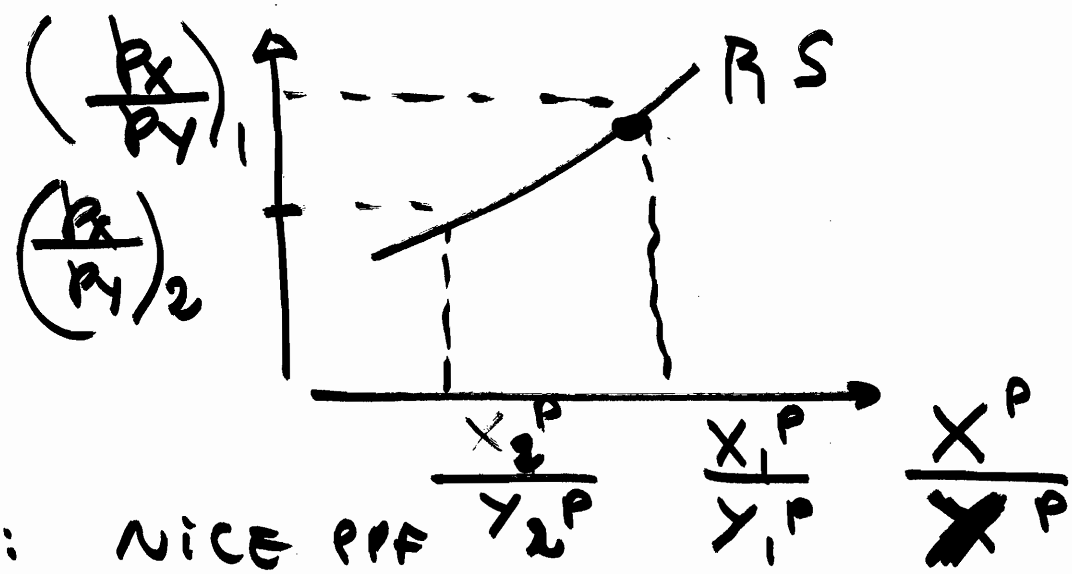
NOTICE THAT BECAUSE OF CRS:

$$p_X = AC_X(w, r)$$

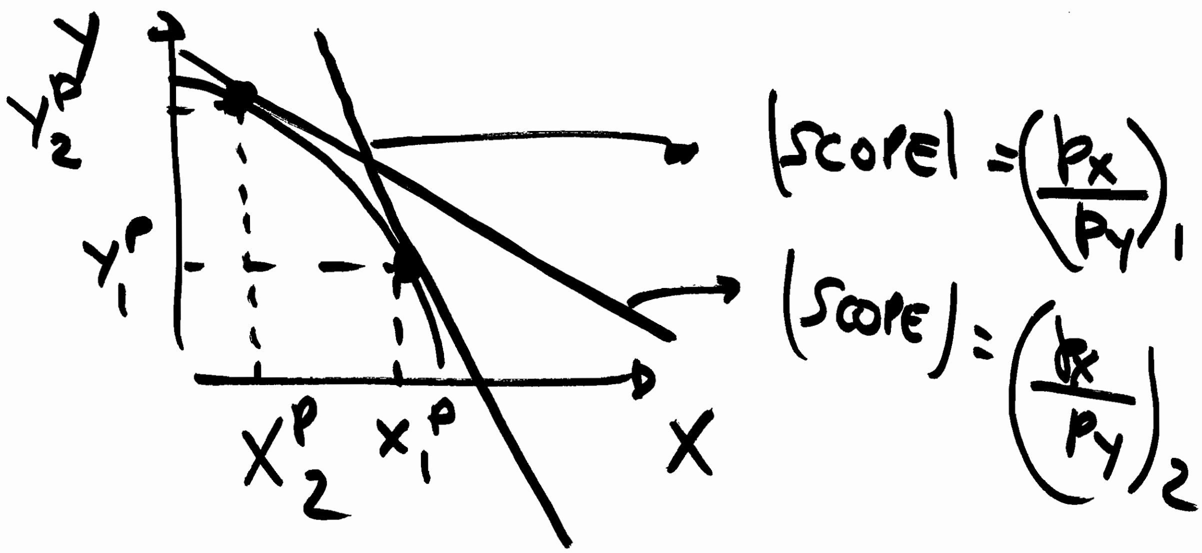
$$p_Y = AC_Y(w, r)$$

IF p_X, p_Y DETERMINED AFTER NUMERAIRE CHOSEN, EQUATIONS ABOVE DETERMINE w, r.

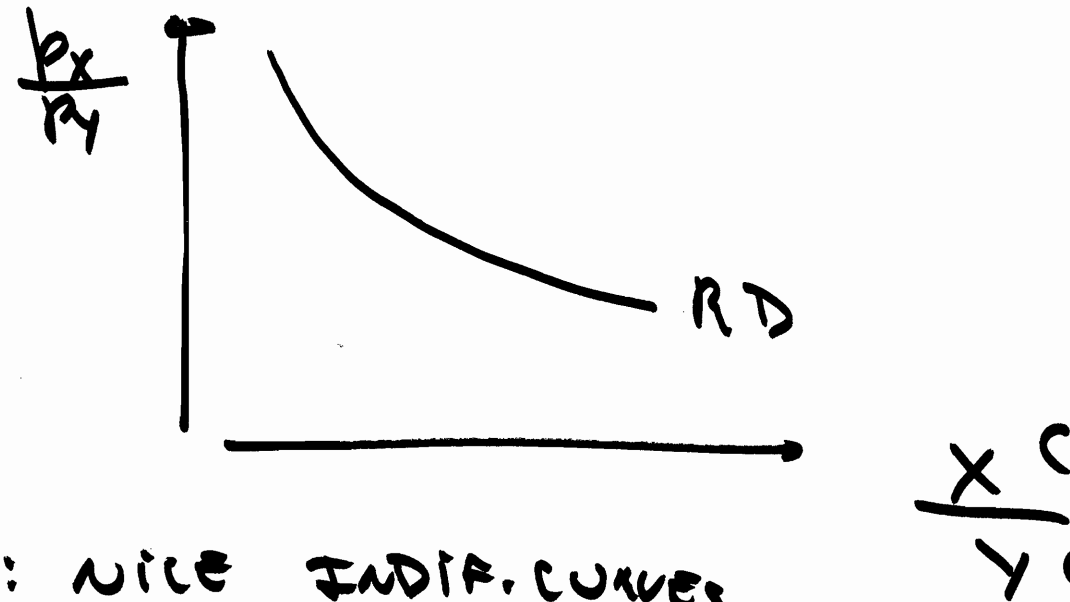
(IV) RELATIVE SUPPLY, RELATIVE DEMAND



EX: NICE PPF



RELATIVE DEMAND



Ex: NICE INDIF. CURVES