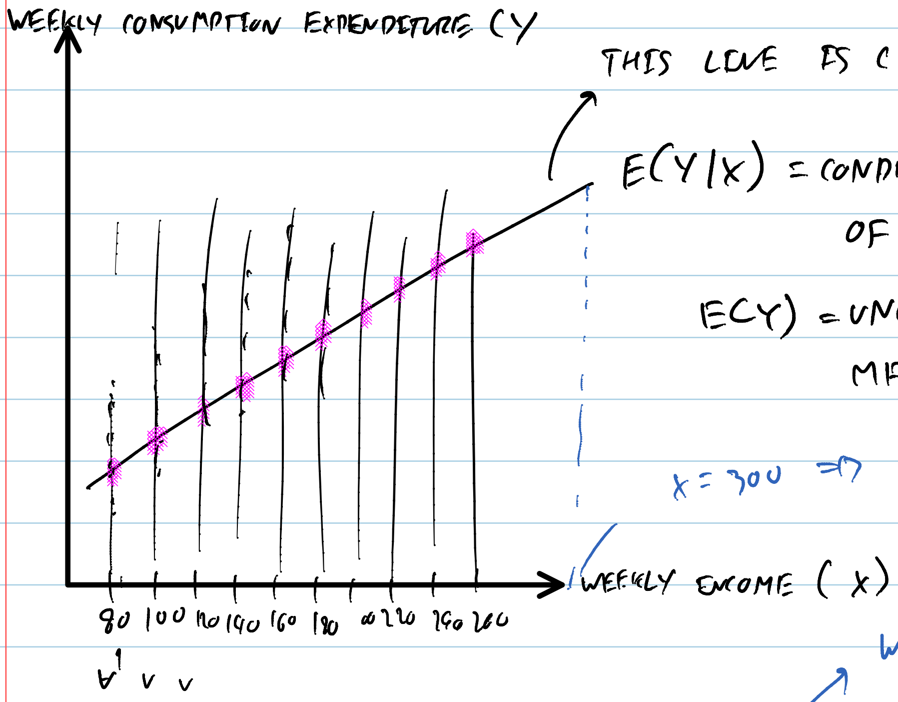
BASIC IDEA ABOUT REGRESSION ANALYSIS



THIS LINE IS CALLED "POPULATION REGRESSION FUNCTION" (PRF)

$E(Y|X)$ = CONDITIONAL MEAN OF Y

$E(Y)$ = UNCONDITIONAL MEAN OF Y

PRF : $E(Y|X_i) = f(X_i)$ ← WEEKLY INCOME

READ : CONDITIONAL MEAN OF Y IS A FUNCTION OF X

LET'S TAKE THE MOST SIMPLEST FORM OF LINEAR FUNCTION

$$\boxed{E(Y|X_i) = \beta_1 + \beta_2 X_i}$$

β_1: INTERCEPT Y-AXIS

β_2: SLOPE COEFFICIENT

THIS IS CALLED "REGRESSION EQUATION" OR "REGRESSION MODEL".

AS WEEKLY INCOME (X) RISES, "ON AVERAGE", CONSUMPTION EXPENDITURE ALSO RISES.

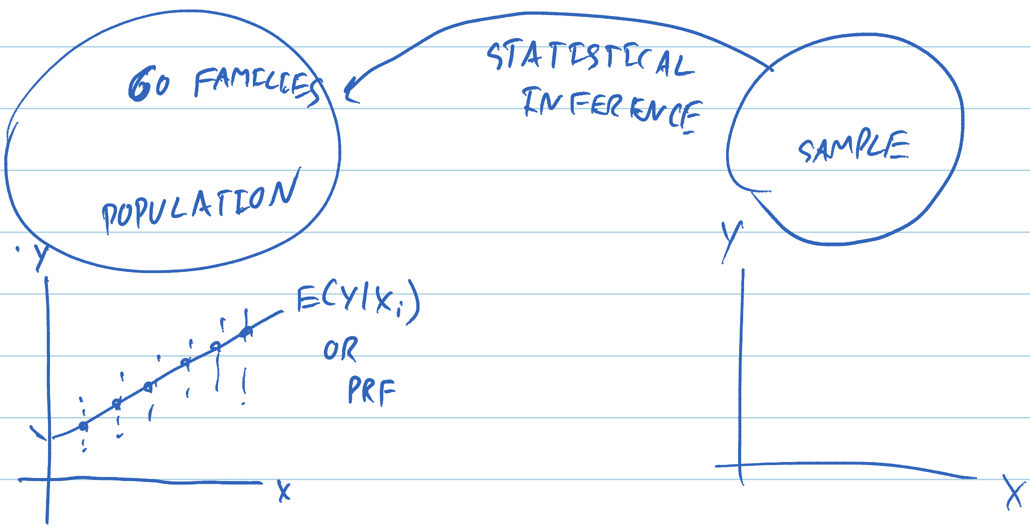
REMARK : THIS MIGHT NOT BE TRUE FOR ALL

REMARK : THIS MIGHT NOT BE TRUE FOR ALL POPULATION. (LOOK AT TABLE 2.1)

SO THIS EQUATION SHOWS AVERAGE RELATIONSHIP BETWEEN CONSUMPTION AND INCOME.

AS A RESULT, THERE WILL BE ERRORS.

$$\underbrace{u_i = Y_i - E(Y \mid X_i)}_{\text{DEVIATION OF } Y_i \text{ FROM ITS CONDITIONAL MEAN}}$$



$$E(Y \mid X_i) = \beta_1 + \beta_2 X_i$$

CONSIDER $u_i = Y_i - E(Y \mid X_i)$

$$Y_i = \underbrace{E(Y \mid X_i)}_{\substack{\text{SYSTEMATIC PART} \\ \text{OR} \\ \text{DETERMINISTIC PART}}} + \underbrace{u_i}_{\substack{\text{NON-SYSTEMATIC PART} \\ \text{OR} \\ \text{STOCHASTIC PART}}}$$

DISTURBANCE TERM

OR
RANDOM
PART

$$\underbrace{Y_i = \beta_1 + \beta_2 X_i}_{} + \underbrace{u_i}_{}$$

AN INDIVIDUAL FAMILY'S CONSUMPTION EXPENDITURE DEPENDS ON ① WEEKLY INCOME (SYSTEMATIC)
② DISTURBANCE TERM

TO MAKE IT CLEAR, TAKE AN EXAMPLE

look

SUPPOSE $X = 200$ (AT A FIXED VALUE OF X)

$$Y_1 = 120 = \beta_1 + \beta_2(200) + u_1$$
$$Y_2 = 136 = \beta_1 + \beta_2(200) + u_2$$
$$Y_3 = 140 = \beta_1 + \beta_2(200) + u_3$$
$$Y_4 = 144 = \beta_1 + \beta_2(200) + u_4$$
$$Y_5 = 145 = \beta_1 + \beta_2(200) + u_5$$

DETERMINISTIC COMPONENT

STOCHASTIC COMPONENT

FROM $Y_i = E(Y|X_i) + u_i$.

TAKE CONDITIONAL EXPECTED VALUE TO THE ABOVE EQUATION:

$$E(Y_i|X_i) = E\left[E(Y|X_i)\right] + E(u_i|X_i).$$

$$= E(Y|X_i) + E(u_i|X_i)$$

SINCE $E(Y_i|X_i) = E(Y|X_i)$, SO.

$$\boxed{E(u_i | x_i) = 0}$$

IMPLICATION ?