Tuesday, January 10, 2012
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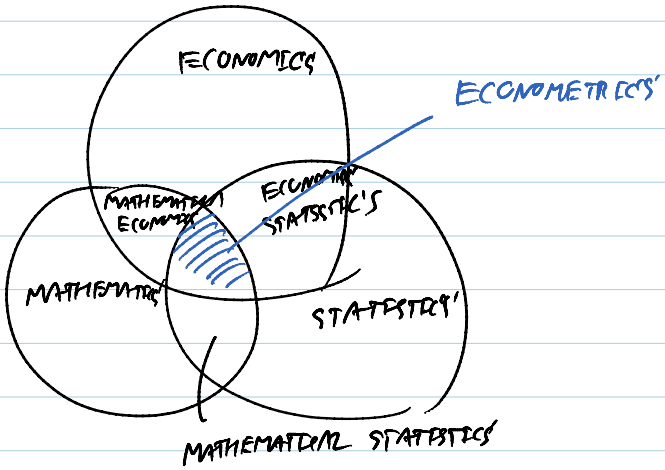
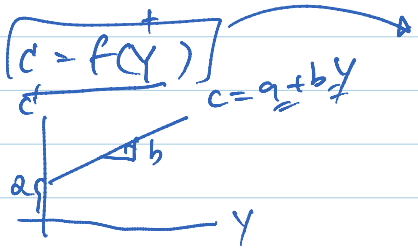
WEEK 1 OVERTURE : THE NATURE OF ECONOMETRICS AND ECONOMIC DATA

→ WHAT IS ECONOMETRICS ?



ECONOMETRICS : ECONOMIC MEASUREMENT



"HOW MUCH" QUESTION

DEFINITION 2 : APPLICATION OF USING MATHEMATICAL STATISTICS TO ECONOMIC DATA IN ORDER TO GIVE EMPIRICAL SUPPORT TO THE ECONOMIC MODELS AND OBTAIN NUMERICAL RESULTS
(GERHARD TINTNER, 1968)

$$WAGE = f(\text{EDUCATION}, \text{TRAINING}, \text{INNATED ABILITES}, \ldots)$$

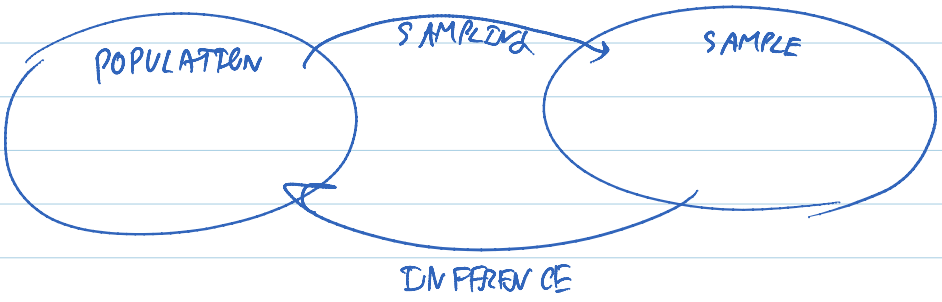
$$w = \beta_0 + \beta_1 EDU + \beta_2 TRA + \beta_3 ABILITIES + u$$

u: error term or disturbance term.

DEFINITION 3 : THE QUANTITATIVE ANALYSIS OF ACTUAL ECONOMIC SITUATION

BASED ON CONCURRENT DEVELOPMENT OF THEORY AND OBSERVATION BY APPROPRIATE METHODS OF (STATISTICAL) INFERENCE.

(P.A. SAMUELSON, T.C. KOOPMANS AND J.R.N STONE, 1954)



WHY STUDY ECONOMETRICS?

- FILL THE GAP BETWEEN "A STUDY OF ECONOMICS" AND BEING "A PRACTICING ECONOMIST"!
- LETS YOU TELL YOUR BOSS:
  - "I CAN PREDICT THE SALES OF YOUR PRODUCT."
  - "I CAN ESTIMATE THE EFFECT ON YOUR SALES IF YOUR RIVAL REDUCES ITS PRICE BY 10 BAHT / UNIT."
  - "I CAN TEST WHETHER YOUR NEW AD. CAMPAIGN IS ACTUALLY INCREASING YOUR SALES".

TYPES OF DATA

① TIME-SERIES DATA ⇒ DATA COLLECTED OVER DISCRETE INTERVALS OF TIME

EX: STOCK PRICES, GDP, INVESTMENT, EXPORTS, IMPORTS, EXCHANGE RATE, INTEREST RATE, ETC.

FREQUENCY OF DATA: DAILY, WEEKLY, MONTHLY, QUARTERLY, ANNUALLY.

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YEAR	GDP	C	I	G	X	M
1970						
1971						
2010						

(2) CROSS-SECTIONAL DATA => DATA COLLECTED OVER SAMPLE UNITS IN A PARTICULAR TIME PERIOD

YEAR 2010

Obs,	WAGE	EDU	GENDER	MARITAL STATUS	WEEKLY EXPENDITURE
1					
2					
3					
500					

(3) PANEL DATA => IN PANEL DATA, WE HAVE A GROUP OF INDIVIDUALS (OR HOUSEHOLDS, FIRMS, COUNTRIES) WHO ARE "OBSERVED" AT SEVERAL POINTS IN TIME

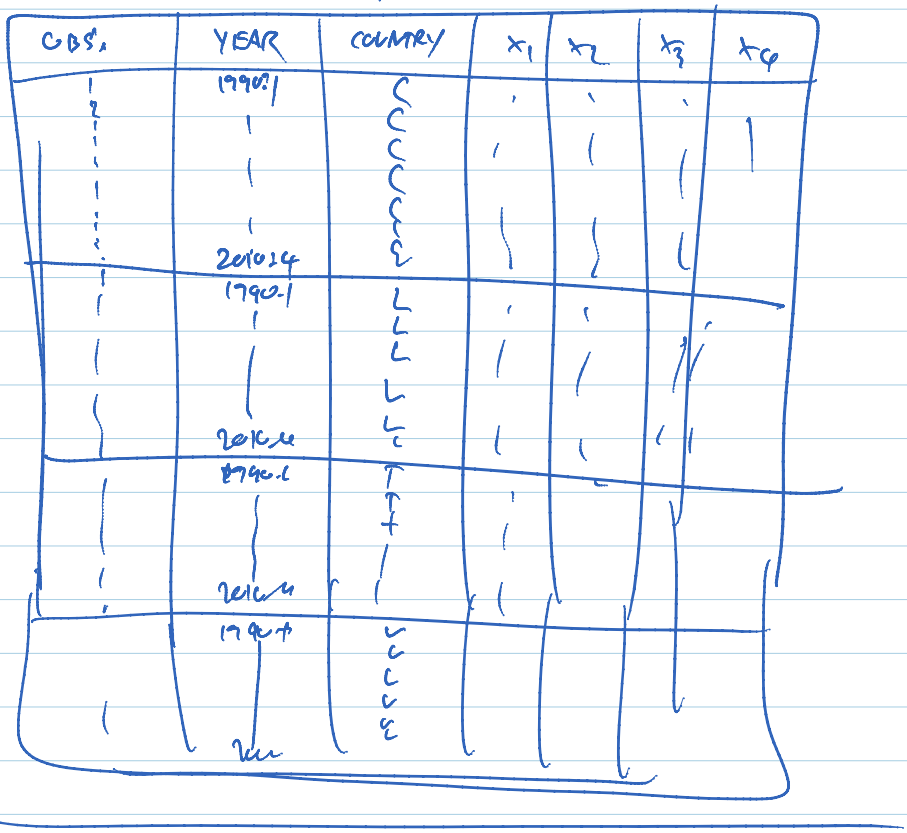
EXAMPLE: MACROECONOMIC PERFORMANCE OF CLTV COUNTRIES

- CAMBODIA
- LAO
- THAILAND
- VIETNAM

VARIABLES OF INTEREST: GDP, M2, GOV. EXP, IM, EX, INTEREST RATE

RESEARCH QUESTIONS: • WHAT ARE THE ENGINES OF GROWTH ?
(SOURCES OF ECONOMIC GROWTH)
• STABILITY ⇒ INFLATION
(CAUSES OF INFLATION)

TIME PERIOD; 1990:1 – 2010.4)



4. POOL – CROSS SECTIONS:

THE DIFFERENCE BETWEEN PANEL DATA AND POOL-CROSS SECTION IS THAT IN POOL-CROSS SECTION, SAMPLE UNITS IN A CERTAIN POINT IN TIME MIGHT BE CHANGED.

EXAMPLE

	GENDER	AGE	INCOME	DEBT	# of CHILDREN
1980 (500)					
1981 (500)					
1982 (500)					
!					

* TRADITIONAL (CLASSICAL / MAINSTREAM) APPROACH

LET'S TAKE A WELL-KNOWN KEYNESIAN CONSUMPTION FUNCTION AS AN EXAMPLE.

KEYNES STATED : ① ECONOMIC THEORY

" THE FUNDAMENTAL PSYCHOLOGICAL LAW IS THAT...

ON AVERAGE, WHEN MEN'S INCOME RISE, CONSUMPTION EXPENDITURE WILL ALSO RISE, BUT NOT AS MUCH AS THE INCREASE IN THEIR INCOME.

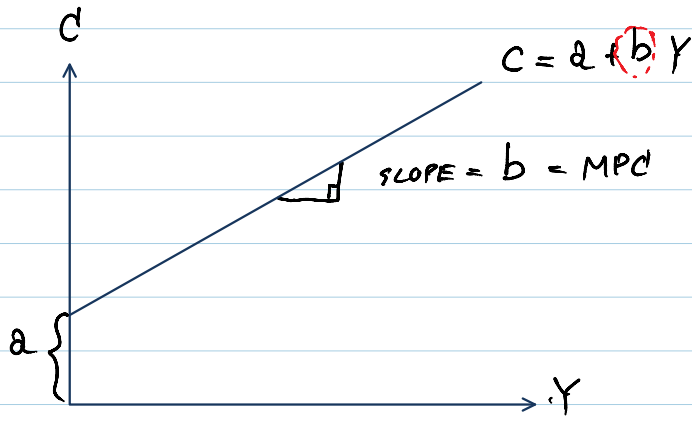
② MATHEMATICAL MODEL : CONSUMPTION FUNCTION BY ECONOMIC THEORY: RELATIONSHIP BETWEEN CONSUMPTION EXPENDITURE AND INCOME.

LET C = CONSUMPTION EXPENDITURE
Y = INCOME
$C = f(Y)$ (ASSUME LINEAR FUNCTIONAL FORM.)

THEN $C = a + bY$ WHERE $b \in (0, 1)$

↙ MARGINAL PROPENSITY TO CONSUME

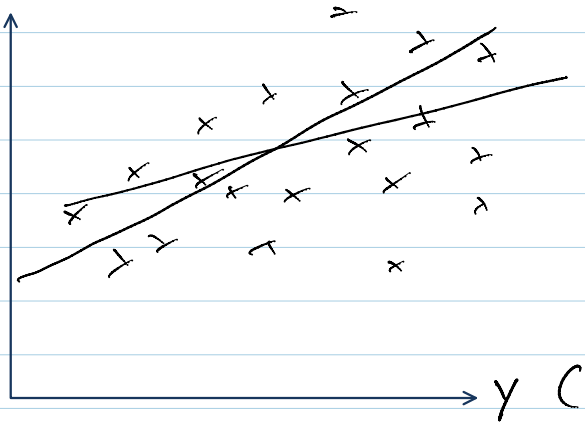
$MPC = \frac{\Delta C}{\Delta Y}$



③ ECONOMETRIC MODEL : GIVEN THAT MATHEMATICAL MODEL ABOVE

$C = a + bY$ ⇒ EXACT/DETERMINISTIC RELATION-

C (CONSUMPTION)



Y (GDP)

SHOW BET. C AND Y.

	C	Y
t_1		
t_2		
⋮		
t_n		

ECONOMETRIC MODEL $C_i = a + bY_i + u_i$

= SIMPLIFIED REPRESENTATION OF REALITY

i = INDEX FOR i^{th} OBSERVATION OR i^{th} TIME

u_i = RANDOM DISTURBANCE TERM OR ERROR TERM W/ WEL-DEFINED PROBABILISTIC PROPERTIES.

THE DISTURBANCE ERROR TERM MAY WELL REPRESENT ALL THOSE FACTORS THAT AFFECT CONSUMPTION BUT NOT TAKEN ONTO A/C EXPLICITLY.

NOTE: CONVENTIONAL METHOD OF WRITING MODELS.

$$Y_i = a + bX_i + U_i$$

WHERE Y = DEPENDENT VARIABLE (EXPLAINED VARIABLE)

X = INDEPENDENT VARIABLE (EXPLANATORY VARIABLE)

$\hat{a}$ = ESTIMATOR FOR PARAMETER a

$\hat{b}$ = ESTIMATOR FOR PARAMETER b.

a, b = PARAMETER FOR MODEL

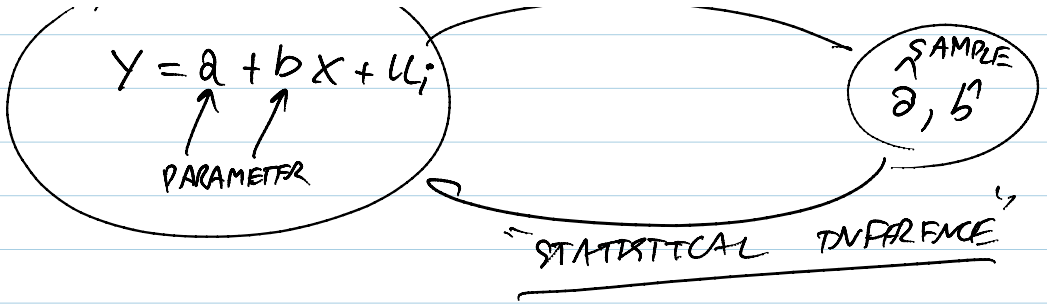
SAMPLING

POPULATION

$Y = a + bX + u_i$

SAMPLE

30,000 C, Y



EXAMPLE OF APPLICATION: IF $C = a + bY$, $b = 0.8$

C: PCE, Y: GDP, b: MPC $= \frac{\Delta C}{\Delta Y}$

$$\frac{dY}{dG_1} \simeq \frac{\Delta Y}{\Delta G_1} = ?$$

MULTIPLIER EFFECT:

$$\text{MULTIPLIER} = \frac{1}{1-MPC} = \frac{1}{1-0.8} = 5$$

$$\therefore \quad \Delta Y = \frac{1}{1-b} \Delta G_1 .$$

AT $Y_i = a + bX_i + u_i$

Y_i	X_i
DEPENDENT VARIABLE	INDEPENDENT VARIABLE
EXPLAINED	EXPLANATORY
REGRESSAND	REGRESSOR
PREDICTAND	PREDICTOR
RESPONSE	STIMULUS OR CONTROL VARIABLE
ENDOGENEOUS	EXOGENEOUS
$\Rightarrow$ LHS VARIABLE	RHS VARIABLE

ESTIMATION METHODS

$\Rightarrow$ SINGLE EQUATION METHOD: ESTIMATION BY USING A SINGLE EQUATION

⇒ SIMULTANEOUS EQUATION METHOD: ESTIMATION BY USING A SYSTEM OF EQUATIONS

EX: MACROECONOMIC MODEL OF THAI ECONOMY (OPEN ECONOMY)

$$Y = C + I + G + (X - M)$$

$$C_t = a + b Y_t + u_t$$

$$I_t = c + d r_t + e \Delta Y_t + v_t$$

$$G = \bar{G} \quad \text{(EXOGENEOUS VARIABLES)}$$

$$X_t = f + g Y^f + z_t$$

$$M_t = h + i Y_t + \gamma_t$$

$$Y_t \equiv C_t + I_t + G + X_t - M_t \quad \text{[IDENTITY EQUATION]}$$

* TESTING OF THE MODEL PERFORMANCE

- TEST FOR ECONOMIC REASONING
- STATISTICAL INFERENTIAL TEST (R^2, PW ETC)
- VERIFICATION OF THE MODEL (PREDICTION ERROR)

NEXT WEEK: STEPS IN ECONOMETRIC ANALYSIS