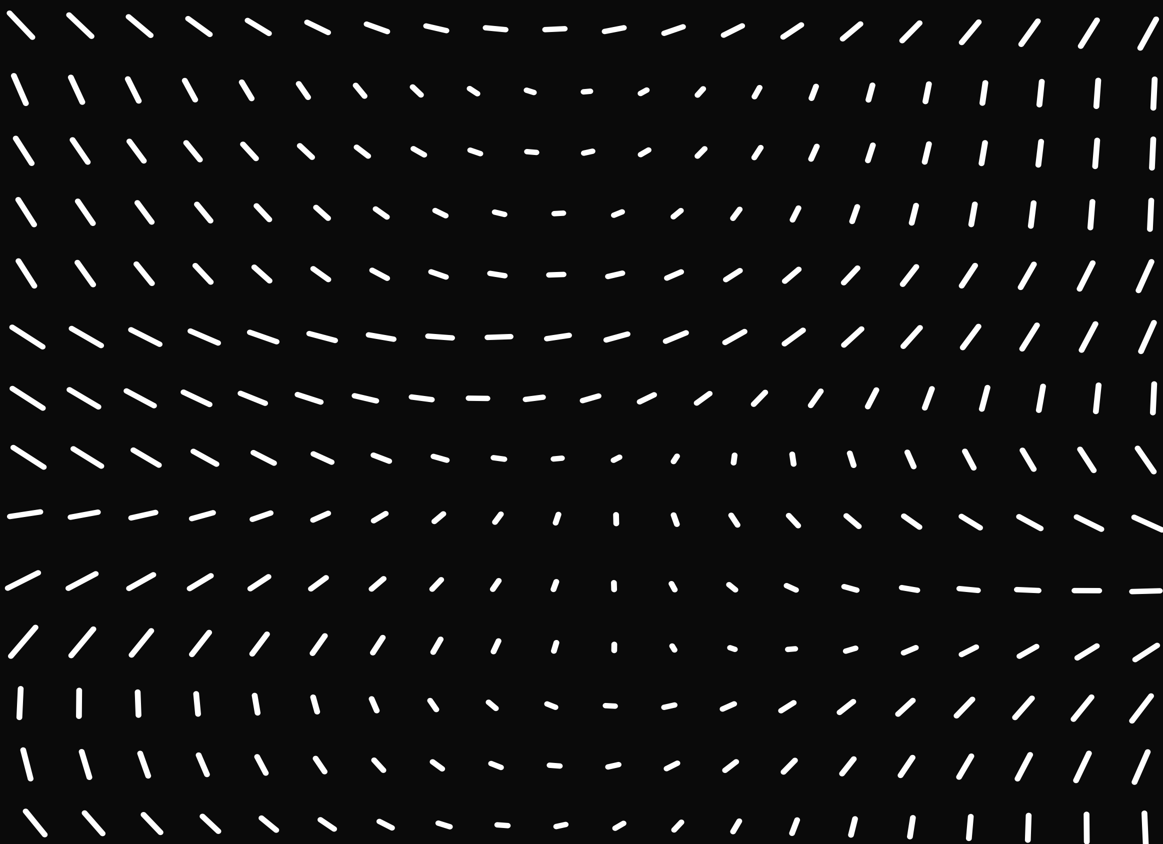


Lecture #1

real per capita aggregate income

pegged to what?

real → Inflation adjusted

Real tries to take into prices changes

per capita - Per person / per population unit

Aggregate
- (Ter.) Territorial → Within Geographical Borders
- (Nat.) National → By citizens

Value = Price × Quantity

£100 (2010)
£200 (2020)
$\Big\}$ Value

Value change = £100

but price = 10 (2010)

price = 20 (2020)

∴ No real growth

What does real mean for services?

Here the coconut is not tangible, so is it the same coconut!

lecture #2

Lecture #3

Divergence or Convergence : What is happening to global inequality ?

Colonialism a key indicator of high growth

All developing countries were once a sovereign nations

covariance

$r_{\text{initial income}, \text{growth rate}} < 0 \longrightarrow$ criteria for convergence

across countries

$$Cov_{x,y} = \sum_i x_i y_i - \bar{X}\,\bar{Y}$$

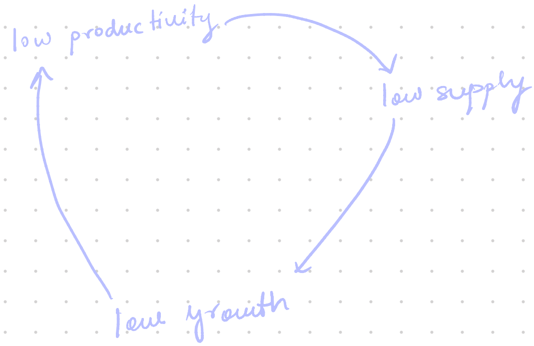
Divergence, Big Time $\longrightarrow$ Assumes lower bound on survival income across the timeline 1870 — 1985, argues there is divergence between developed countries and developed countries.

Lecture #5

Lecture #6

Royal exchequer / National wealth idea started coming in only from 17^{th} century

William Petty and his "Political Arithemetic"
↳ seen as an important figure ; English



Lecture #8

Division of labour (DOL) (specialization) $\Rightarrow$ Increase in productivity

why DOL in Agriculture not work?

Agro-based economy $\Rightarrow$ low-productivity economy

labour productivity $\Rightarrow$ output / units of labour

Average labour productivity = Value (x price)

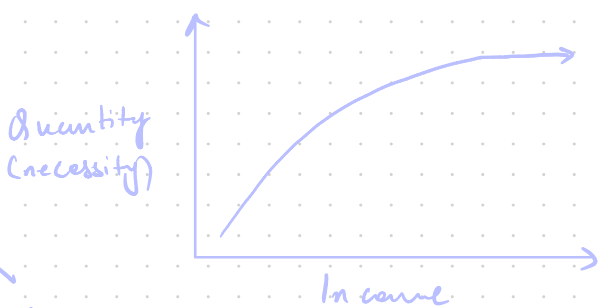
Income Elasticity of demand $E_I = \dfrac{\text{\% change in Quantity demanded}}{\text{\% change in income}} = \dfrac{\%\Delta Q}{\%\Delta Y}$

(from POV of consumer)

typically > 0 (necessity) → normal goods

exceptionally < 0 (inferior goods)

(Measure of individual $\approx$ measure of population) usually



$\frac{dE}{dY}$

Engels' Law : $\frac{dE_I(\text{food})}{dy} < 0 \Rightarrow$ As income (y) goes up, E_I of food goes down

$\Downarrow$

$\frac{\%\, d^2Q}{\%\, dy^2} < 0$

E_I for poor household tend to be high

Trad. economy, E_I was high (for food) => little scope for secondary manufactured commodities

Uganda → wheat, Kasava

↳ Growth rate might become zero or -ve. if all spent primary producer

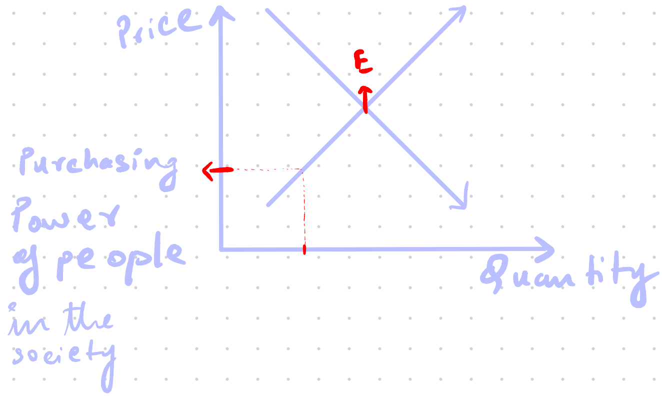
Terms of Trade for primary producer $= \frac{P_{food}}{P_{industrial\ commodities}}$ → ↓ for Uganda

$\frac{\text{Food Expen.}}{\text{Income}} \hat{=} 1$ then

Question

can there be famine in society which is in supply-demand equillibrium? Yes

since the purchasing power of people may not be as high as the price at equillibrium?


Price
E
Purchasing Power of people in the society
Quantity

Lecture #11

Growth Theory / Models

↓

Formal methods

- dynamics of Growth
- factors behind Growth
- empirical Testing using real data

- Harrod - Domar Model
- Solow - Swan class of models
- Endogeneous Growth Models
- Institutions + Growth (Post Mid semester)

Savings is simply <u>income not consumed</u>

$Y \rightarrow$ income

$S \rightarrow$ savings

$s \rightarrow$ Marginal Propensity to Save (MPS)

"How much more will be saved per unit income change"

$$MPS \rightarrow s = \frac{dS}{dY} = 0.3 = s'$$

in general, s' may not be constant, but the model considers s' to be constant. There is some empirical evidence to back this up.

For a more complex model: $s' = f(Y)$ & $s' > 0$

National Saving →
- Household Savings
- Business Savings
- Goverment Savings

} closed Economy, only these considered in HD model

- Foreign Saving
- Foreign Aid
- Remittances

} open Economy

when Harrod-Domar model was developed, all the economies were largely closed

Capital in standard economies is produced means of production

produced / Non-produced → man-made / Natural

means of production → Labour, Land } Natural

Investment $I = \Delta K$

Investment is change in Capital stock (K)

$$-\ \frac{K}{Y} = \frac{\Delta K}{\Delta Y} = C$$

Production Function

$$Q = F(x_i)$$

output

x_i = i^{th} input

$$Q = F(L, K)$$

labour Capital

$$F_L, F_K > 0$$

$$F_{LL}, F_{KK} < 0$$

In case of constant returns to scale

$$F(\lambda L, \lambda K) = \lambda F(L, K) = \lambda Q \quad [\lambda > 0]$$

Diminishing Returns to factor → Decrease observed when changing just one

Decreasing Returns to scale → Decrease observed when changing all inputs

Lecture # 12

"Saving (S) = Investment (I)" → Assumption that is usually seen to be violated in the real world as well as theoretically.

$$S = I$$

$$F(\lambda L, \lambda K) = \lambda Q = \lambda Y$$ { We use Q & Y interchangeably }

$$\frac{K}{Y} = \frac{\Delta K}{\Delta Y} = c$$, given CRS { Capital - Output Ratio }

$$sY = I = \Delta K = c\Delta Y$$

$$sY = c\Delta Y$$

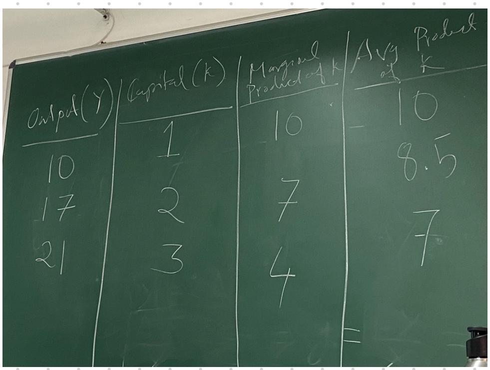
$$\Rightarrow \boxed{\frac{\Delta Y}{Y} = \frac{s}{c}}$$

Growth Rate of $Y = \frac{\Delta Y}{Y} = \frac{s}{c}$

s → marginal propensity to save

c → Capital - Output Ratio

Capital - Output Ratio is by definition $\frac{\Delta K}{\Delta Y}$ which is equal to



$g = \left(\frac{s}{c}\right) = s\left(\frac{1}{c}\right)$ $\frac{1}{c} \rightarrow$ output-capital Ratio OR Average Productivity of Capital

g → Growth Rate of income

Solow-Swan Model (Neoclassical Growth Model)

- Labour not abundant, unlike HD model
- CRS
- $Y = F(L, K)$, F_L & $F_K > 0$ and F_{LL} and $F_{KK} < 0$
- Diminishing Returns to Labour & Capital
- There is a constant rate of Growth of Labour Force n

$$n = \frac{\left(\frac{dL}{dt}\right)}{L} = \frac{\dot{L}}{L}$$

- Constant depreciation Rate (δ)
- $S = sY$ and $I = \Delta K = S$

Given CRS,

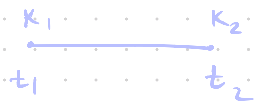
$$F(\lambda L, \lambda K) = \lambda F(L, K) = \lambda Y \quad [\text{any } \lambda > 0]$$

$$\lambda = \frac{1}{L} \Rightarrow F\left(1, \frac{K}{L}\right) = \frac{1}{L} F(L, K)$$

Lecture # 13

$I = \Delta K + \delta K = S$

$\Delta K = K_2 - K_1$

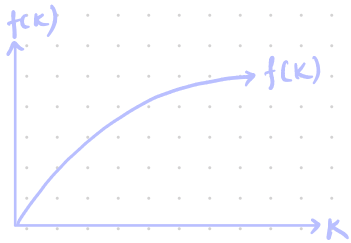


$Y = F(L, K)$ with CRS

$\frac{Y}{L} = F\left(1, \frac{K}{L}\right)$

$y = f(k)$, $f' > 0$

$f'' < 0$



Example:

$F(x, y) = x^{1/2} y^{1/2}$

$f(k) = F\left(1, \frac{x}{y}\right) = f(k) = \left(\frac{x}{y}\right)^{1/2} = k^{1/2}$

$K = \left(\frac{K}{L}\right) \cdot L = kL$

$\frac{dK}{dt} = \underbrace{L \cdot \frac{dk}{dt}}_{\text{capital deepening}} + \underbrace{k \cdot \frac{dL}{dt}}_{\text{capital widening}}$

$$\frac{dK}{dt} = L\frac{dk}{dt} + k\cdot\frac{dL}{dt}$$

$$\frac{1}{L}\cdot\frac{dK}{dt} = \frac{dk}{dt} + \frac{K}{L}\cdot\frac{dL}{dt}$$

$$\frac{1}{L}(I - \delta K) = \frac{dk}{dt} + kn$$

$$s\frac{Y}{L} - \delta\frac{K}{L} = \frac{dk}{dt} + kn$$

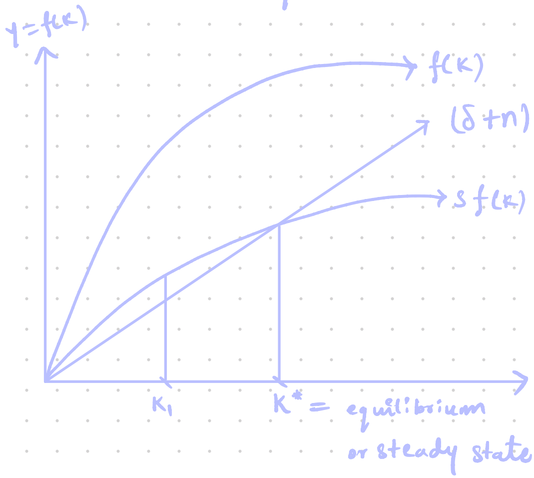
$$sy - \delta k = \frac{dk}{dt} + kn$$

$$\frac{dk}{dt} = sy - (\delta + n)K$$

solow-growth equation in terms of the dynamic path of k.

steady state is when $\frac{dk}{dt} = 0$

or when $sy = (\delta + n)K$



At $K = K^* \Rightarrow \frac{K}{L}$ is constant

L has growth rate n

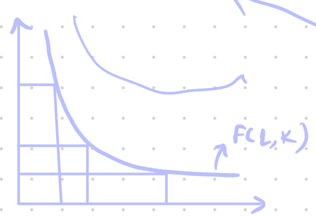
$$\frac{dL}{dt}\frac{1}{L} = n$$

$\Rightarrow$ At K^*, $\frac{dK}{dt}\frac{1}{K} = n$

At $K = K^*$, $Y = Y^* \Rightarrow \frac{dY}{dt}\frac{1}{Y} = n$

$\therefore$ Y, K, L all grow at the same rate at steady-state.

$$F(L, K) = L^x K^y \quad , \quad 0 < x < 1, \ 0 < y < 1$$



$$\log(x\cancel{x}y) = c$$

$$xy = e^c$$

Lecture # 14

$$Y = A L^{\alpha} K^{\beta}$$

Cobb-Douglas Production function

$$y_i = A K_i^{\alpha} L_i^{1-\alpha}$$

Proximate

v/s

Fundamental

Causes of long-run growth

Geography History Institutions

Lecture #15

Lecture #16

ways to imply statistically significant causality

$$y = a + bx + \varepsilon$$

$\hat{b}$ = estimator of b = +ve or −ve (which is statistically significant)

$$X = c + dZ + \varepsilon$$

$\hat{d}$ = statistically significant

Not correct

$$\begin{tikzcd} Z \arrow[r] & X \arrow[r] & Y \end{tikzcd}$$

$$\begin{tikzcd} & X_2 \arrow[dr] & \\ Z \arrow[ur] \arrow[r] \arrow[dr, bend right] & X_1 \arrow[r] & Y \\ & X_3 \arrow[ur] & \end{tikzcd}$$

$$\begin{tikzcd} Z \arrow[r] & X \arrow[r] & Y \end{tikzcd}$$

$$\begin{tikzcd} Z_1 \arrow[dr] & & \\ Z_2 \arrow[r] & X \arrow[r] & Y \\ Z_3 \arrow[ur] & & \end{tikzcd}$$

First stage: z is an instrument

$$x = a + bz + \varepsilon$$

$$\hat{x} = \hat{a} + \hat{b} z$$

second stage

$$Y = c + d\hat{u} + e$$

If $\hat{d}$ is statistically significant, then causality is established between X and Y

Natural Experiments

Lecture #17

Schematic framework showing how institutions matter

Pareto Efficiency ⇒ A distribution of economic output among economic agent such that it is not possible to make someone better off without making someone worse off.

↳ Pareto inefficiency leading to Pareto Improvement.

De-Jure Political Power → formal guy in power

De-facto Political Power

↳ in effect, guy running the defacto guy from behind

Lecture #18

Lecture #19

What should replace growth as the major development objective?

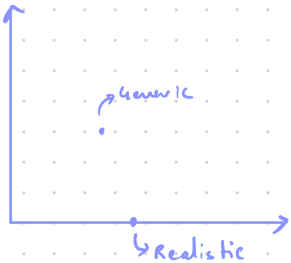
Absolute Poverty v/s Relative Poverty

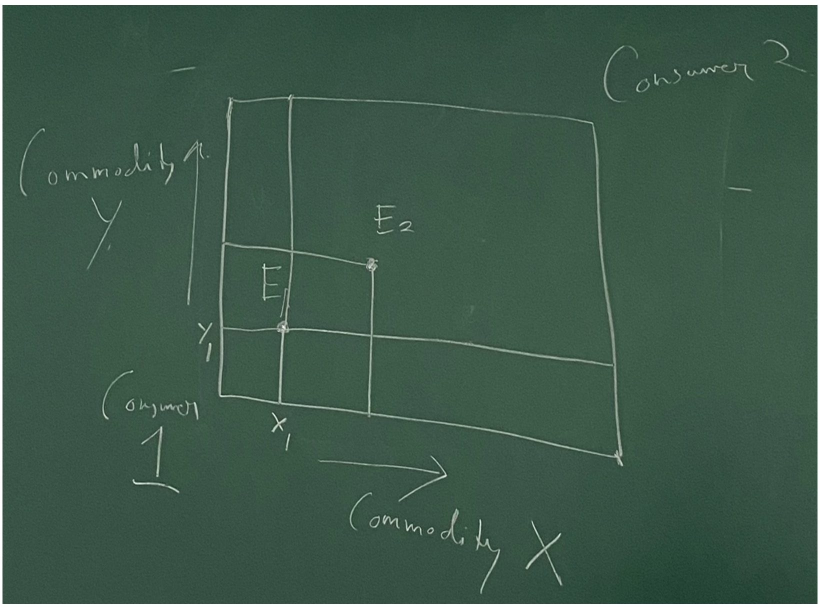
↓ Deficit of some basic ingredients of minimum quality of life

↓ Notion of poverty which <u>content</u> dependent

Lecture #21

Endowment: Bundle/Vector that you start your economic life with.





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一時半　六時半　九

私の パスポートは

Lecture #22

- Land inequality seen as the root of social inequality
- Capping the amount of land you can own
- Ensuring every family does have some ownership of land as a form of social redistribution of assets
- This one time re-distribution of initial endowment is difficult to bring about, but does not need sustainence over longer period of time (20+ years) due to political instability
- China, Vietnam - not mentioned in slides
- Soviet land experience an example of failed land reform
- Why land reforms happened in Japan, South Korea & Taiwan?
  - Due to America and its need to propagate its capalistic ideology.

How does land reform help?

Efficiency or Growth Effect + Equity effect

Efficiency or Growth Effect → Small farms are more productive (per hectare)

Equity effect → Output more evenly distributed

- Major Non-economic benifits like break down of social heirarchy etc. (in slides)

- Growth Rate (1960-1985) for i^{th} country =

$$\alpha + \beta_1 GDP60_i + \beta_2 PRIM60_i + \beta_3 GINI60 + \beta_4 GINILAND + \varepsilon$$

$\hat{\beta}_1 = -0.44$

$H_0 : \beta_1 = 0$

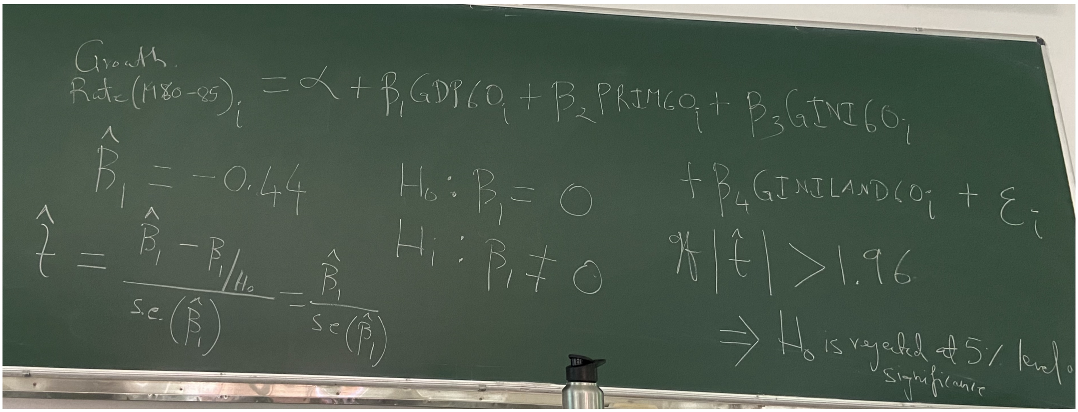
$H_A : \beta_1 \neq 0$

brakets in the table denote t-values

$$\hat{t} = \frac{\hat{\beta}_1 - \beta_1 \text{ (under } H_0)}{\text{Standard Error of } \hat{\beta}_1} = \frac{\hat{\beta}_1}{s.e.(\hat{\beta}_1)}$$

If $|\hat{t}| > 1.96$ then reject H_0

- Limits of land reform
  - Very small lands may lead to lands being productively unviable
  - severe intergeneration fragmentation has lead to smaller average land sizes



Lecture #24

Means v/s ends

Ends → Capabilities approach (Sen's Idea)

Means → Basic needs approach (Basic needs approach)

Lecture #25

"carrying capacity" - of habitation?

↳ The ability of the planet to accomodate life; Human life.

Ecological economist v/s environmental economist

Calculation of green GDP → GDP accounting for environmental degradation

Weak Sustainability

- Physical and natural capital are substitutable
- Maintaining a non-depleting stock of physical + capital as a whole

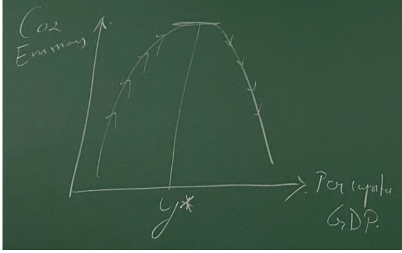
Strong Sustainability

- No substitution
- Maintain a non-depleting stock of natural capital only

Lecture #27

(last class)

$$\hat{C} = \hat{P} + \hat{y} + \hat{c} + \hat{e}$$



P = population

y = per capita income

c = CO_2 emission per unit of energy

e = energy efficiency (energy required per unit of production)