Single slide to be provided in the exam

Inequality

Gini Index

- $\gamma = \frac{N+1}{N-1} - \frac{2}{N(N-1)\mu} \sum_{i=1}^{N} \rho_i x_i$
- $\gamma = \frac{1}{\mu N(N-1)} \sum_{i>j}^{N} \sum_{j}^{N} |x_i - x_j|$

Theil Measures

$$L = \sum_{i=1}^{n} \frac{1}{n} \log \frac{1/n}{y_i} = -\frac{1}{n} \sum_{i=1}^{n} \log \frac{y_i}{1/n}$$

$$T = \ln n - H(x) = \sum_i y_i \ln \frac{y_i}{1/n}$$

J-Divergence = T + L

J Decomposes variables **and categories**

$$J = \frac{1}{N\mu} \sum_{i=1}^{N} (x_i - \mu) \ln\left(\frac{x_i}{\mu}\right).$$

Variables Decomposition (for T, L & J)

$$T = T_e + \sum_{h=1}^{K} Y_h T_h$$

T = Te + Ti ; Te/T is the Contribution of a variable to inequality like in Mincer Regressions R^2 for Variance of Logs

General Entropy S- measure

$$S = \frac{1}{\varepsilon(1-\varepsilon)} \left[1 - \frac{1}{n} \sum_{i=1}^{n} \left(\frac{x_i}{\mu}\right)^{1-\varepsilon}\right]$$

ε=0 Theil T; ε=1 Theil L;

DUAL - A dual distribution follows :

$$U_2 = \phi + (1-\phi) U_1$$

Theil –T Dual:

$$T2 = T1 - \ln(1-\phi)$$

The Dual of the Gini Index is the Gini Index

Derivation from Social Welfare Function

Atkinson Index for $\epsilon \neq 1$

- $W = \frac{1}{N} \sum_{i=1}^{N} \frac{X_i^{1-\varepsilon}}{1-\varepsilon}, \varepsilon \neq 1$

Inequality trough the Atkison Index

- $I = 1 - [\frac{1}{N} \sum_{i=1}^{N} (\frac{X_i}{\mu})^{1-\varepsilon}]^{\frac{1}{1-\varepsilon}}$

Gini

$$W = \mu(x*) = \int_0^\infty u(x) w(x) f(x) dx$$

If u(x) = x and w(x) =2 [1 – F(x)]

$$W = \mu\,(1 - G)$$

Dynamic Decomposition:

$$Ln(W\ \ ) = Ln(\mu) + Ln(1-G)$$

$$\gamma^* = \gamma + g$$

$$\gamma^* = \Delta Ln(W\ \ )\ \text{etc}$$

Shared Prosperity

$$\mu_s = \mu(1 - I)$$

$$I = 1 - \frac{\mu_s}{\mu}$$

Dynamic Decomposition by Income Source:

$$\Delta Ln(\mu_{st}) \sim \frac{1}{2} \sum_{i=1}^{k} \left(\frac{\mu_{is(t-1)}}{\mu_{s(t-1)}} + \frac{\mu_{ist}}{\mu_{st}}\right) \Delta Ln(\mu_{it})$$

Inequality of Opportunity

$$\vartheta_s = \vartheta(1 - I_o)$$

$$I_o = 1 - \frac{\vartheta_s}{\vartheta}\ ; -1 \leq I_o \leq 1$$

Poverty

FGT Indicator

- $P^\alpha = \frac{1}{n} \sum_{i=1}^{q} (\frac{Z - Y_i}{Z})^\alpha$

Poverty Index

Sen

- $P_s = P^0 \delta + P_1 (1 - \delta^P)$

Watts

- $P_W = (\frac{1}{N} \sum Ln(\frac{Z}{y_i}))$

Clark, Hemming and Hulp (1981)

- $P_{C-H-U} = (\frac{1}{nc}) \sum [1 - (\frac{y_i}{Z})^c]$

Multidimensional Poverty

$$MPI = H \cdot A \qquad H = \frac{q}{n} \qquad A = \frac{\sum_i^q c_i}{q}$$

Global Social Indicators

Human Development Index (HDI)

- $HDI = \sqrt[3]{IhXIeXIi}$

where:
Ih = health index;
Ie = education index;
Ii = income index

Inequality-adjusted HDI (IHDI)

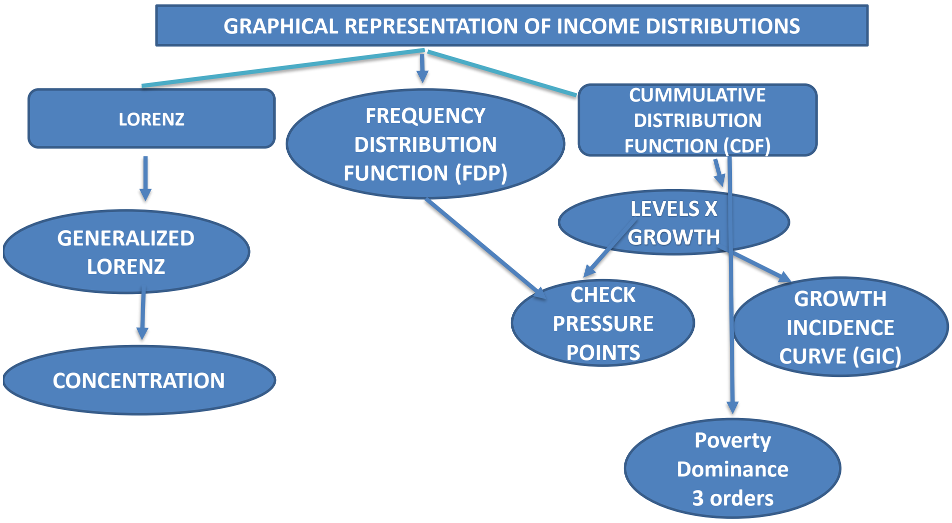
- $Ax = 1 - \frac{\sqrt[n]{X_1 \ldots X_n}}{\bar{X}}$
- $Ix^* = (1 - Ax) Ix$
- $IHDI = \sqrt[3]{Ih^* * Ie^* * Ii^*}$

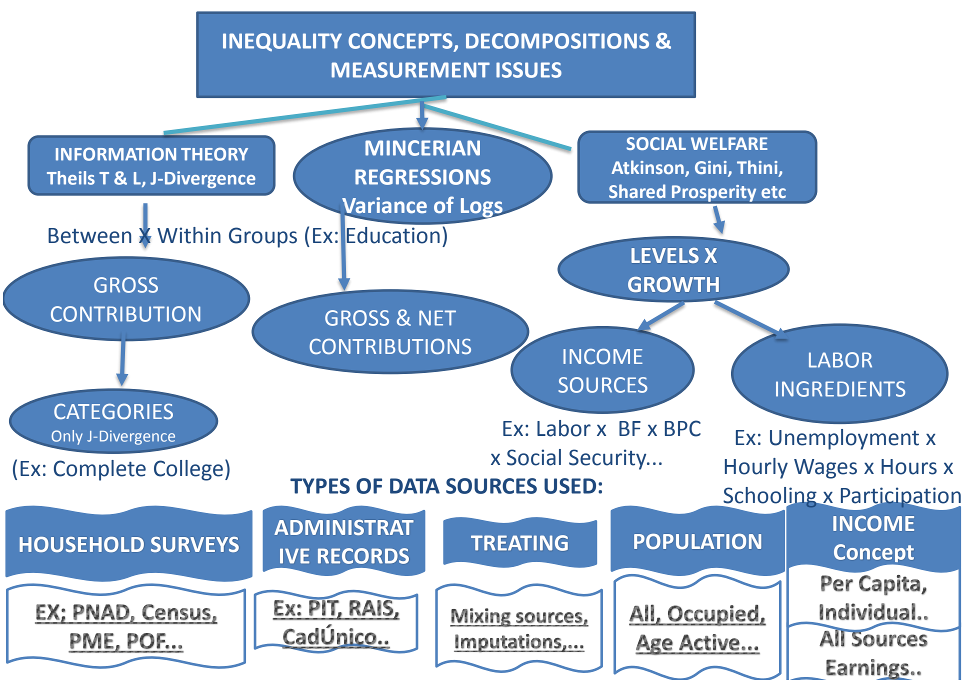
Polarization (Alienation & Identification)

$$W_B = \int_0^\infty u(x) v(x) f(x) dx = \mu - (m_2 - m_1) + 2\mu G$$

The relative loss of social welfare due to Polarization

$$B = 2(G_B - G_W)$$


GRAPHICAL REPRESENTATION OF INCOME DISTRIBUTIONS
LORENZ
FREQUENCY DISTRIBUTION FUNCTION (FDP)
CUMMULATIVE DISTRIBUTION FUNCTION (CDF)
GENERALIZED LORENZ
CONCENTRATION
LEVELS X GROWTH
CHECK PRESSURE POINTS
GROWTH INCIDENCE CURVE (GIC)
Poverty Dominance 3 orders


INEQUALITY CONCEPTS, DECOMPOSITIONS & MEASUREMENT ISSUES
INFORMATION THEORY Theils T & L, J-Divergence
MINCERIAN REGRESSIONS Variance of Logs
SOCIAL WELFARE Atkinson, Gini, Thini, Shared Prosperity etc
Between x Within Groups (Ex: Education)
GROSS CONTRIBUTION
GROSS & NET CONTRIBUTIONS
LEVELS X GROWTH
INCOME SOURCES
LABOR INGREDIENTS
CATEGORIES Only J-Divergence
(Ex: Complete College)
Ex: Labor x BF x BPC x Social Security...
Ex: Unemployment x Hourly Wages x Hours x Schooling x Participation
TYPES OF DATA SOURCES USED:
HOUSEHOLD SURVEYS
EX; PNAD, Census, PME, POF...
ADMINISTRATIVE RECORDS
Ex: PIT, RAIS, CadÚnico..
TREATING
Mixing sources, Imputations,...
POPULATION
All, Occupied, Age Active...
INCOME Concept
Per Capita, Individual..
All Sources Earnings..

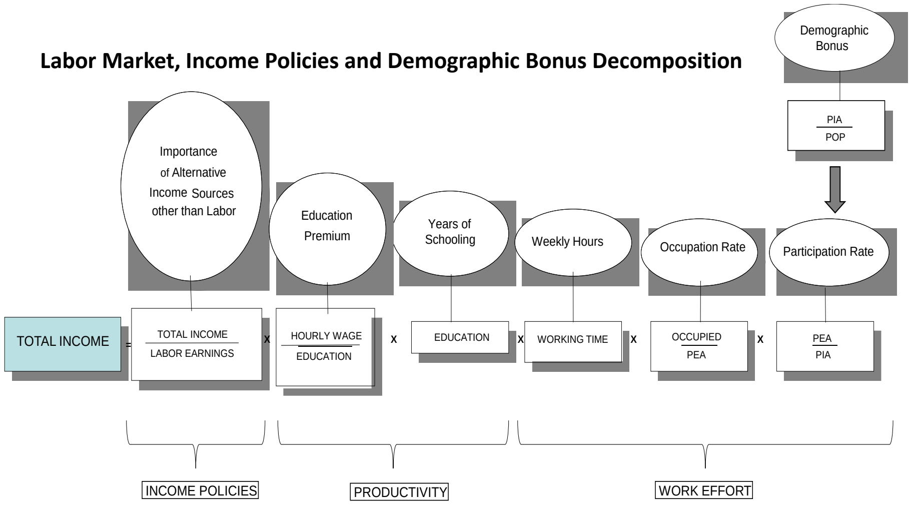
Classical Labor Market Ingredients Decomposition

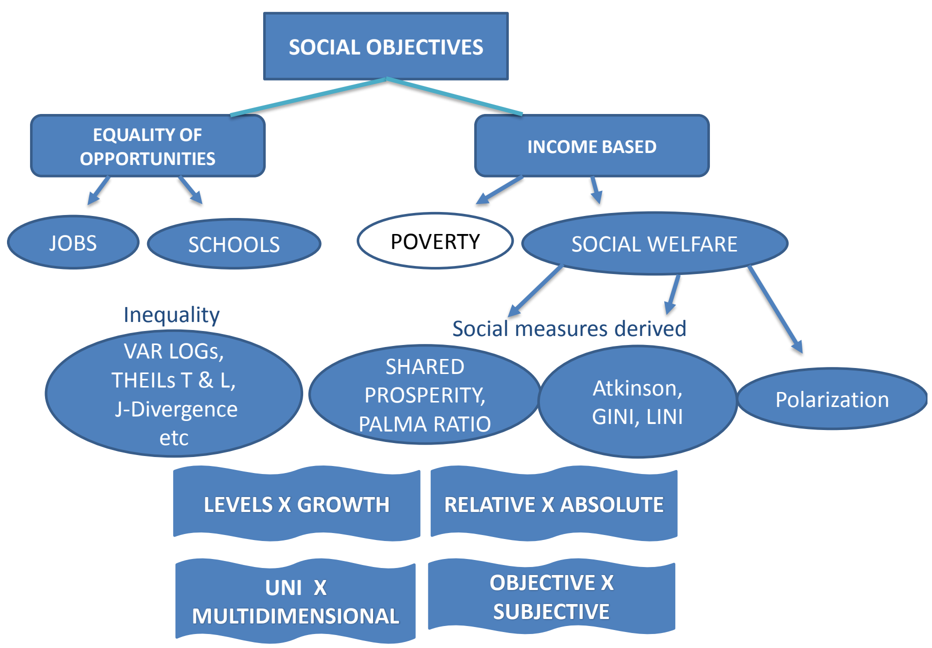
Labor Economics

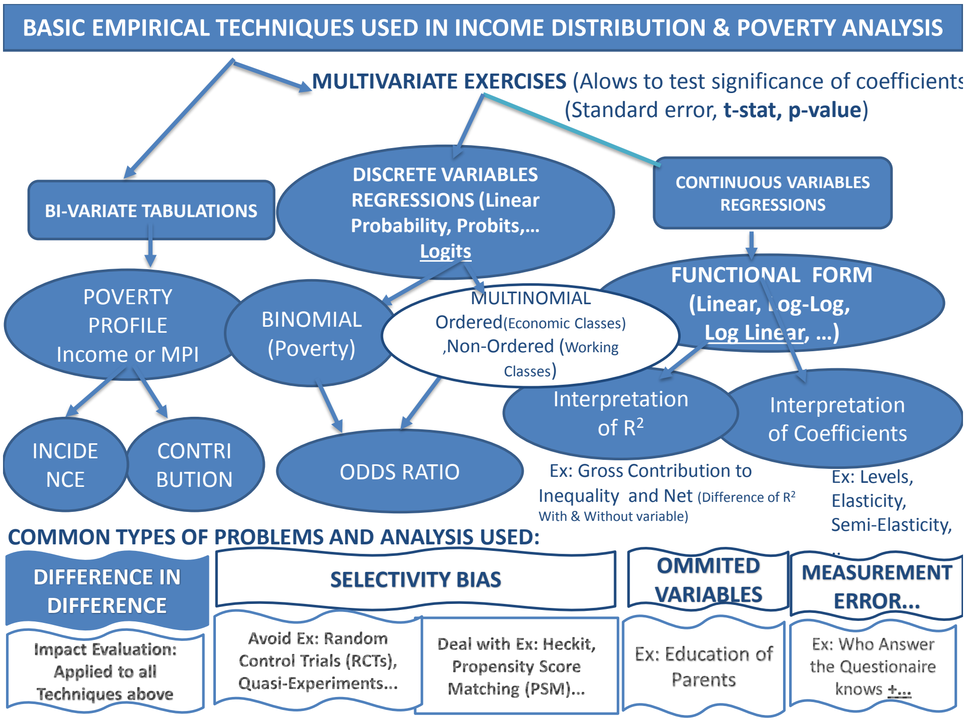
Occupied population (E): People working
Unemployed population (U): People looking for job but not occupied
Inactive population (I): People not occupied

Active Age Population AAP (*PIA*):
occupied + unemployed + inactive = (E + U + I)
Economically Active Population EAP (*PEA*)
occupied + unemployed (E + U)
Participation Rate: *(PEA) / (PIA)* = *(E + U) / (E + U + I)*
Unemployment Rate: *(Unemployed) / (PEA) = (U) / (E + U)*
Occupation Rate in *PEA*: *(Occupied) / (PEA) = (E) / (E + U)*

Labor Market, Income Policies and Demographic Bonus Decomposition






BASIC EMPIRICAL TECHNIQUES USED IN INCOME DISTRIBUTION & POVERTY ANALYSIS
MULTIVARIATE EXERCISES (Alows to test significance of coefficients
(Standard error, t-stat, p-value)
BI-VARIATE TABULATIONS
DISCRETE VARIABLES REGRESSIONS (Linear Probability, Probits,… Logits
CONTINUOUS VARIABLES REGRESSIONS
POVERTY PROFILE Income or MPI
BINOMIAL (Poverty)
MULTINOMIAL Ordered(Economic Classes) ,Non-Ordered (Working Classes)
FUNCTIONAL FORM (Linear, Log-Log, Log Linear, …)
Interpretation of R^2
Interpretation of Coefficients
INCIDE NCE
CONTRI BUTION
ODDS RATIO
Ex: Gross Contribution to Inequality and Net (Difference of R^2 With & Without variable)
Ex: Levels, Elasticity, Semi-Elasticity,
COMMON TYPES OF PROBLEMS AND ANALYSIS USED:
DIFFERENCE IN DIFFERENCE
SELECTIVITY BIAS
OMMITED VARIABLES
MEASUREMENT ERROR…
Impact Evaluation: Applied to all Techniques above
Avoid Ex: Random Control Trials (RCTs), Quasi-Experiments…
Deal with Ex: Heckit, Propensity Score Matching (PSM)…
Ex: Education of Parents
Ex: Who Answer the Questionaire knows +…