

# Lecture VII: Inequality

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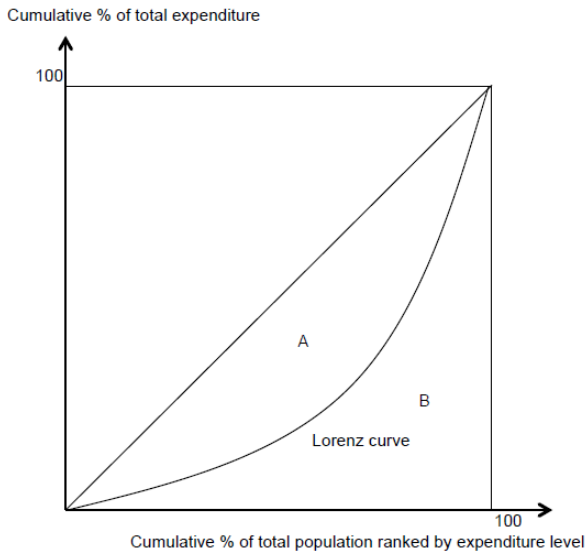
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# 1. Describing and measuring inequality

- By analogy with the poverty profile, a graphical representation of inequality is given by the Lorenz curve:
  - ▶ Constructed using per-capita expenditure or income for a representative sample of the population we want to study
  - ▶ Individuals/households are ranked from poorest to richest
  - ▶ Cumulative percentage of population is represented on the horizontal axis
  - ▶ Cumulative percentage of income/expenditures is represented on the vertical axis
  - ▶ A Lorenz curve located further away from the 45-degree line represents a higher level of inequality

# Lorenz curve



# Measuring inequality

- Define:

- ▶  $n$ : number of persons in the population
- ▶  $r_i$ : income or expenditure rank of person  $i$ ,  $1 \leq r_i \leq n$
- ▶  $y_i$ : income or expenditure of person  $i$
- ▶  $\mu$ : average income/expenditure in the population
- ▶  $\sigma$ : standard deviation of expenditure
- ▶  $Y$ : total expenditure of the population

- Consider the following inequality indicators:

- 1 The Coefficient of Variation:

$$CV = \frac{\sigma}{\mu} \quad (1)$$

- 2 The Gini Coefficient:

$$G = \frac{A}{A+B} = \frac{2}{n\mu} \text{cov}(y.r), 0 \leq G \leq 1 \quad (2)$$

- 3 The Theil Entropy Index:

$$T = \sum_{i=1}^n \frac{y_i}{Y} \ln(ny_i/Y) \quad (3)$$

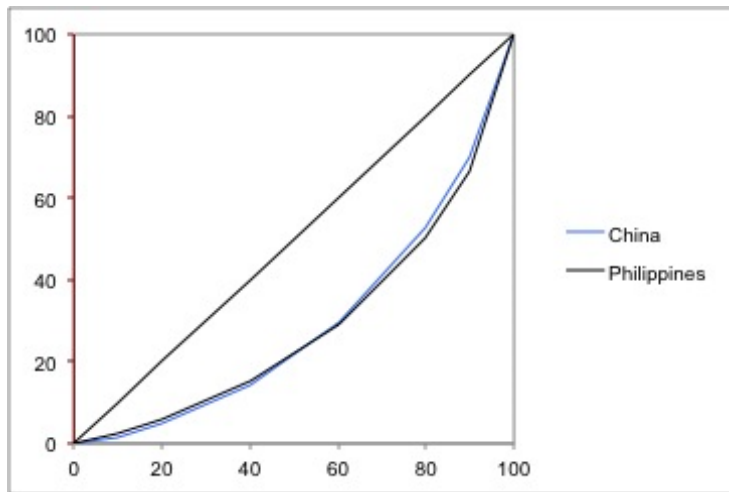
- 4 Kuznets ratios:

$$K = \frac{\text{ShareX\%Rich}}{\text{ShareX\%Poor}} \quad (4)$$

# Inequality indicators

Country	PPP-GDPpc	Gini	Income share		Kuznets ratio
			lowest 20%	highest 20%	20/20
South Africa	11426	63	2.7	68.2	25.3
Honduras	4188	59	1.8	61.9	34.4
Brazil	13773	55	0.8	58.8	73.5
Rwanda	1242	51	5.2	56.8	10.9
Nigeria	5048	49	4.4	54.0	12.3
Peru	9724	49	3.8	53.1	14.0
Mexico	14726	47	4.8	53.2	11.1
China	9053	42	4.7	47.5	10.1
Senegal	2140	40	6.1	46.9	7.7
Thailand	12575	40	6.7	47.2	7.0
Indonesia	7872	37	7.7	44.1	5.7
Vietnam	4400	36	7.4	43.4	5.9
Ethiopia	1041	34	8.0	41.9	5.2
India	4549	34	3.7	42.8	11.6
Bangladesh	2093	32	8.9	41.4	4.7
Pakistan	4139	30	9.6	40.0	4.2

# Lorenz curves can cross



## 2. Decomposing inequality: population subgroups

- No all the inequality measures can be decomposed (e.g. Gini index), but the Theil index have better decomposition properties to analyze the role of subgroups
- Decomposing the  $T$  index:

$$T = \sum_{j=1}^k \gamma_j T_j + \sum_{j=1}^k \gamma_j \ln(\gamma_j / m_j) \quad (5)$$

Where:

$\gamma_j$ : income share of group  $j$

$m_j$ : population share of group  $j$

$\sum_{j=1}^k \gamma_j T_j$ : within-group inequality

$\sum_{j=1}^k \gamma_j \ln(\gamma_j / m_j)$ : between-group inequality



# Decomposing inequality: by source of income

- The Gini coefficient can be decomposed by source of income
- Consider  $k$  sources of income, so there are  $k = 1, 2, \dots, K$  sources, each of them contributing  $y_{ik}$  to the total income  $y_i$  of household  $i$  with  $\sum_k y_{ik} = y_i$
- The Gini can be decomposed in the following way:

$$G = \sum_k w_k R_k G_k \quad (6)$$

Where:

$\mu_k$ : mean income from source  $k$

$w_k = \mu_k / \mu$ : weight of the income source in mean income

$r_k$ : within source household rank

$R_k = \text{cov}(y_k, r) / \text{cov}(y_k, r_k)$ : relative correlations

$G_k$ : Gini of income source

# Decomposing inequality in Egypt

Rural Egypt	Agriculture	Non-agriculture	Remittances	Total
Weight of income source (%) $w_k$	57.8	32.6	9.6	100
Relative correlations $R_k$	0.63	0.16	0.92	1
Gini of income source $G_k$	0.51	0.68	0.93	0.30
Relative Gini $G_k/G$	1.69	2.25	3.09	1.00
Share of income source in total Gini (%)	61.0	11.7	27.3	100

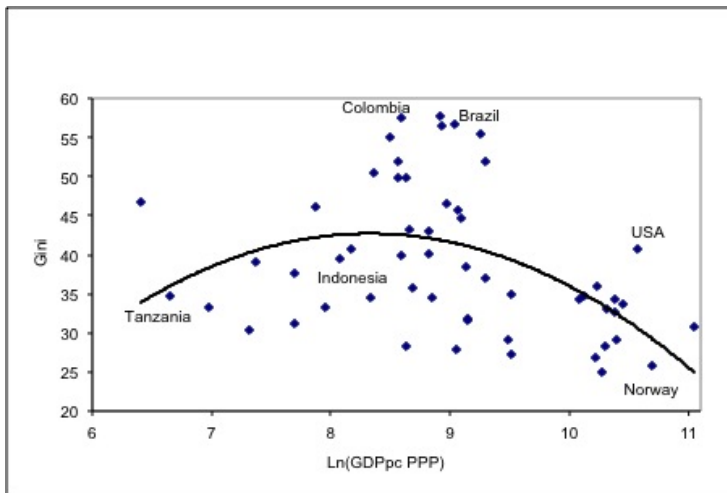
### 3. Relationship between inequality and development

- How do we explain inequality?
- Simon Kuznets (1955) suggested that there is a U-inverted relationship between inequality and per-capita income
- This is one of the most controversial empirical regularity in development economics
- The equation estimated to test this hypothesis is the following:

$$s_i = \alpha + \beta y_i + \gamma y_i^2 + \epsilon, \quad (7)$$

- The hypothesis implies that  $\beta > 0$  and  $\gamma < 0$ .

# Kuznets curve



- Robinson (1976) proposed a simple explanation for the Kuznets inverted-U: transition from agriculture to industry
- Why this relationship has attracted so much interest among economists?
  - ▶ Rise of inequality at low levels of income would be considered “normal”: no need of policies to address inequality, just focus on growth (policy implication)
  - ▶ Can we claim causality?
- Kuznets and his followers based their conclusions on cross-country data
  - ▶ Cross-country data shows that Latin American countries are more unequal

- Does the Kuznets curve hold using panel data? Deininger and Squire (1998) added country fixed-effects:

$$s_{it} = \alpha + \beta y_{it} + \gamma(1/y_{it}) + \delta_i + \epsilon_{it}, \quad (8)$$

- Relationship disappears once country-fixed effects are accounted for