# Introduction to Distributional Analysis

Training Workshop on the
Commitment to Equity Methodology

CEQ Institute, Asian Development Bank,
and The Ministry of Finance

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How Do We Describe the Distribution of Income?

- We can graph it:

- We can summarize it in single statistics:
  - mean
  - median
  - inequality
  - poverty

- Inequality measures the dispersion of the distribution

- Poverty measures how many people are at the lower (left) end

Kernel density estimate

kernel = epanechnikov, bandwidth = 158.5432
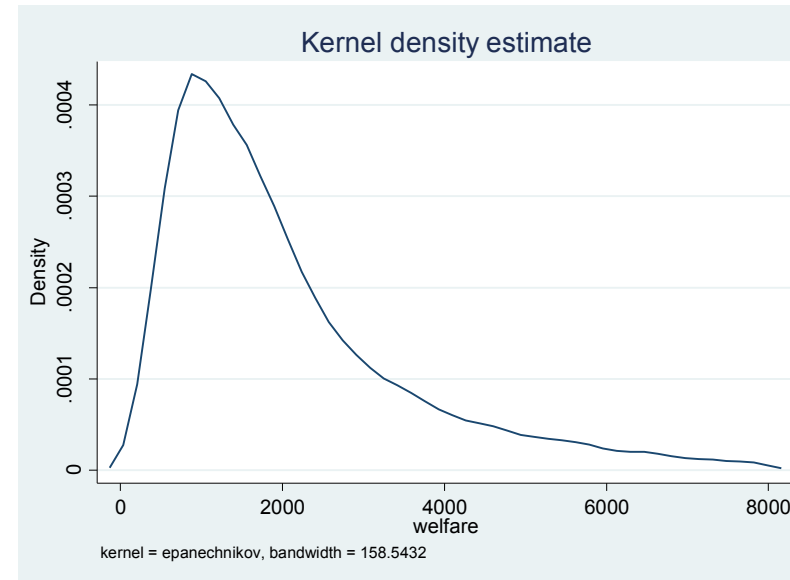
Measuring Inequality

- There are many, many inequality measures

- By far the most popular is: Gini coefficient

- Conceptually, the easiest way to understand the Gini coefficient is with a Lorenz curve
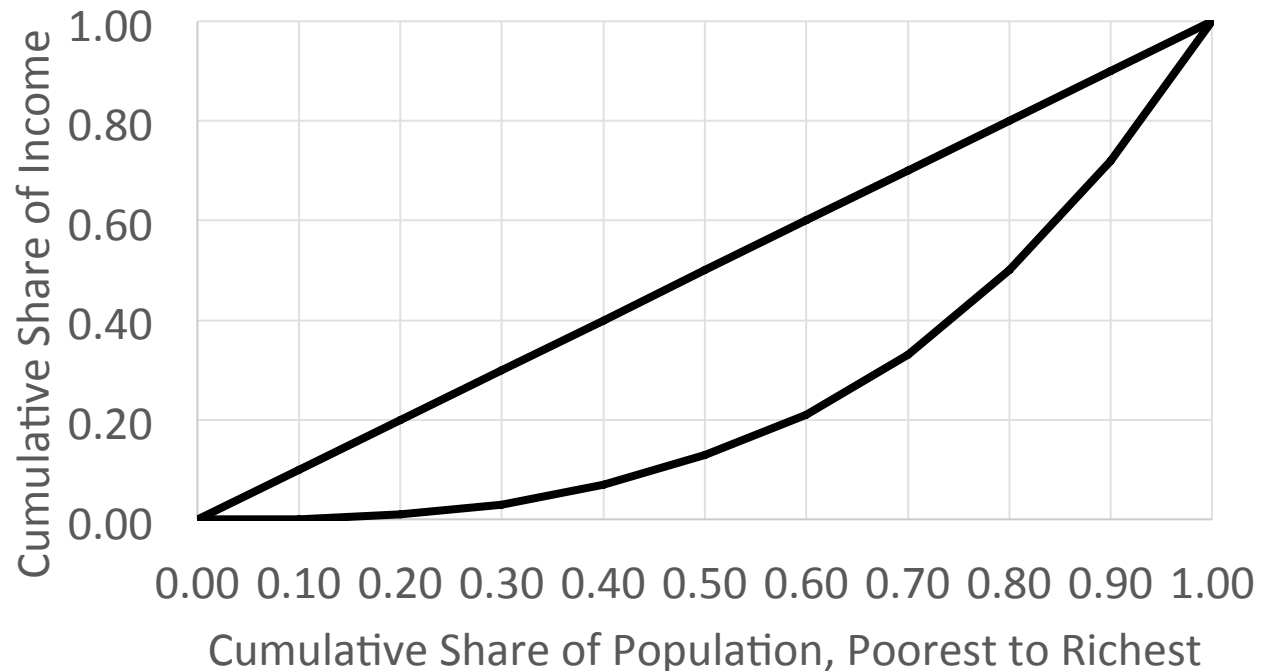
Measuring Poverty

- There are many, many poverty measures

- By far the most popular is: Foster-Greer-Thorbecke measure (FGT)

- $FGT(\alpha)=1/n \sum i\uparrow\blacksquare((z-y\downarrow i)/z)\downarrow+\uparrow\alpha$

- α is a parameter, allowing the measure to vary

  - α = 0 gives us the headcount index
  - α = 1 gives us the poverty gap index
  - α = 2 gives us the poverty severity index

Assessing the Distributional Consequences of a Tax or Expenditure – Marginal Effects

- One intuitive measure is the amount that inequality changes when we add or subtract that item to/from income
  - CEQ calls this the "marginal contribution (effect)"
  - equally valid for inequality (Gini) or poverty (FGT)

- It seems like we can have a large marginal contribution if:
  - the tax or expenditure is well-targeted
  - the tax or expenditure is large

- But careful! Your intuition may be wrong.

- In CEQ terms, it matters which "income" you use as the base

Assessing the Distributional Consequences of a Tax or Expenditure – Progressivity

- A different approach is to assess the "progressivity" of a tax or expenditure

- One way to do this is via "concentration curves"

Lorenz curve and concentration curves
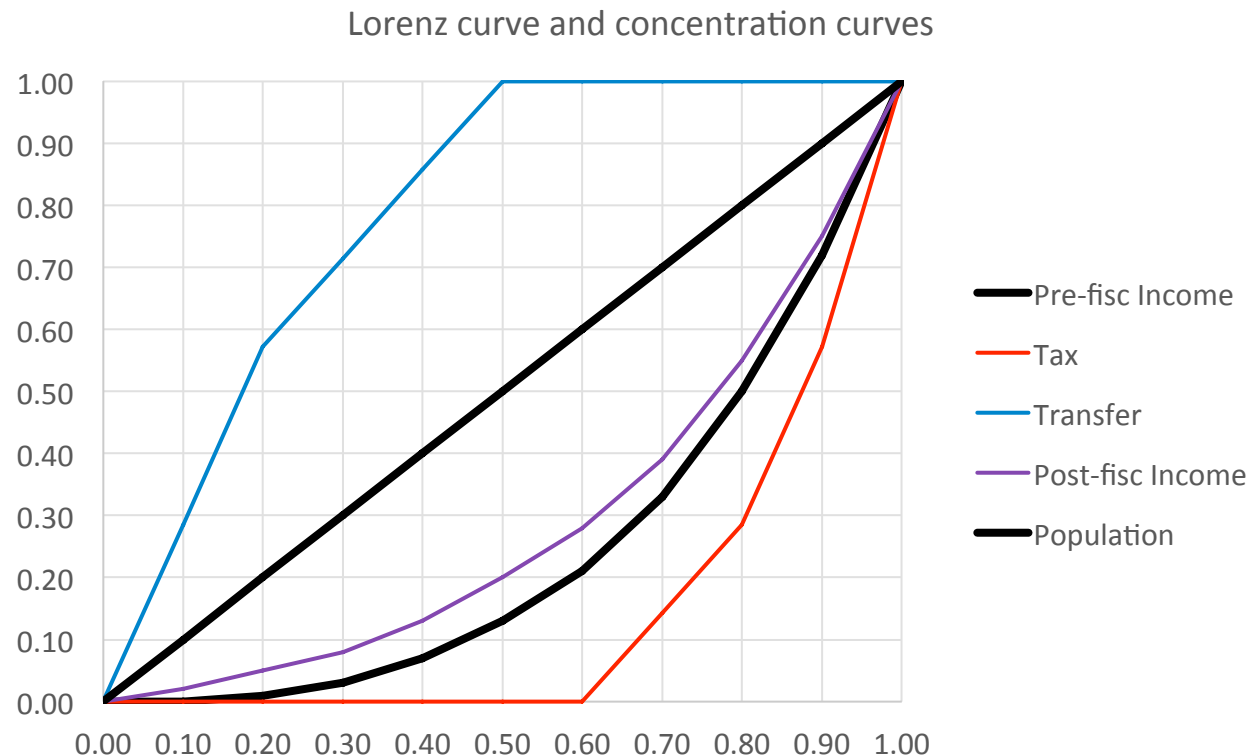
Assessing the Distributional Consequences of a Tax or Expenditure – Progressivity

- We can also calculate a single number summary of the concentration curve: the concentration coefficient
  - Negative values indicate concentration among poorer people, and vice-versa
- A variant on that is the Kakwani index:
  - concentration coefficient - Gini coefficient
- NOTE: these measures are independent of the size of the tax or expenditure. They only measure concentration or "targeting"

Assessing the Distributional Consequences of a Tax or Expenditure – Impoverishment and Enrichment

- Standard poverty (and inequality) measures are "anonymous"

- Even if a tax/expenditure combination leaves poverty unchanged, it may well make some people poorer ("impoverish" them) and others richer ("enrich them")

- Lustig and Higgins produce measures of these effects
  - Paper reproduced in the CEQ Handbook, ch.4

Assessing the Distributional Consequences of a Tax or Expenditure – Effectiveness of a Tax or Expenditure

- Two basic approaches
  - Compare how much a tax or expenditure reduces poverty or inequality to how much a "perfect" tax or expenditure *of the same size* could reduce poverty or inequality
  - Ask how much "bang for the buck" we get from a tax or expenditure: how much does the poverty gap decline divided by the total amount of the tax or expenditure
  - NOTE: the CEQ ado files for these measures are not ready yet

Assessing the Distributional Consequences of a Tax or Expenditure – Other Approaches

- "Pro-poor"
  - Do the poor get absolutely (or relatively) more of a benefit, or pay less of a tax?

- Quintile or decile shares or averages
  - Simple tables
  - The shares are just a summary of the Lorenz and concentration curves

- Many more

- Be cautious. There are exceptions to your intuition when dealing with many items together

Assessing the Distributional Consequences of a Tax or Expenditure – An Example

- Please see inc_dist.xlsx for numerical examples and calculations