

Inequality
Positive analysis: indicators and determinants

1. Describing and measuring inequality

1.1. Describing inequality: Graphic representation of inequality with the Lorenz curve (Figure 1)

Objective: Represent inequality in income, source price, wealth, and/or landholding.

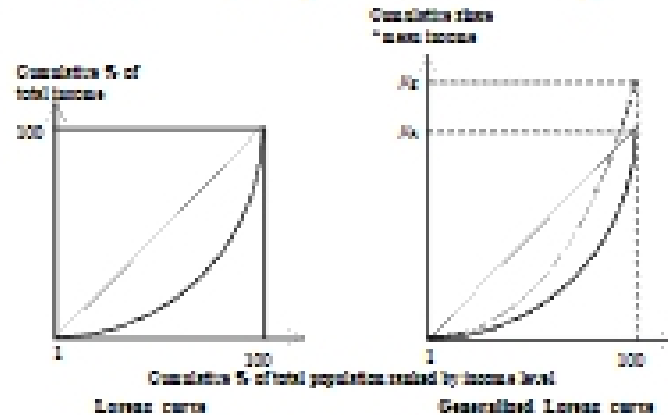


Figure 1. Lorenz curves

Note 1: If two Lorenz curves cross, inequality comparisons require additional criteria.
Note 2: Generalized Lorenz curves recover the role of both inequality and average income level on the fraction of mean income held by any percentile of the population.

1.2. Measuring inequality: alternative indicators

- Desirable properties of inequality indicators (Dalton):
- Anonymity principle: Permutations of people should not affect the inequality measure.
 - Dalton transfer principle: A transfer from a richer to a poorer person should reduce inequality.
 - Population principle: The inequality index should be unaffected by population size.
 - Relative income principle: Index should be unaffected by changes in absolute income levels, only by relative incomes.

An inequality index is said to be Lorenz-consistent if it satisfies these four properties.

Define: n = number of persons in the population
 n_i = income rank of household i , $1 \leq n_i \leq n$
 y_i = income of household i
 μ = average income
 σ = standard deviation of income
 Y = total income of the population.

For group data:
 $k = 1, \dots, K$ groups
 n_k = number of households in group k
 μ_k = average income in group k .

• Coefficient of variation: $CV = \frac{\sigma}{\mu}$.

CV index is Lorenz-consistent.

• Gini coefficient: $G = \frac{A}{A+B} = \frac{2}{n\mu} \text{cov}(y, r^*)$.

Gini index is Lorenz-consistent.

• Theil entropy index: $T = \frac{1}{n} \sum_{i=1}^n \frac{y_i}{Y} \ln \left(\frac{y_i/Y}{1/n} \right)$

Limit: equality = 0 $\leq T \leq \ln n$ = maximum inequality.

Does not satisfy the population principle.

• Income shares and Kuznets ratio

Income share: Share of income of the poorest 20% (x_{20}) in total income.

Kuznets ratio: Ratio of income of richest 20% (x_{80}) to poorest 20% (x_{20})

Does not satisfy the transfer principle.

Two useful properties of indicators are:

- Decomposable in between and within sub-populations inequality (regions, socio-economic groups). Gini is not decomposable, Theil and CV are decomposable
- Possibility to compute the index, even with some negative incomes y_i . Possible with Gini, and CV, not with Theil.

2. Decomposition of inequality indices

2.1. Decomposition of the coefficient of variation by sources of income

$$\sum_i \frac{\Delta_i}{\mu} \frac{CV_i}{CV} = \sum_i w_i \alpha_i = 1$$

Δ_i = mean income from source i

CV_i = CV of income source i

w_i = weight of income source i or share of source i in average income = Δ_i/μ .

α_i = relative concentration coefficient

$$\mu = \text{cov}(y, y)$$

2.2. Decomposition of the Gini coefficient by sources of income

$$G = \frac{2}{n\mu} \text{cov}(y, r^*) = \sum_i \frac{\Delta_i}{\mu} \left[\frac{2}{n\mu_i} \text{cov}(y_i, r_i^*) \right] \frac{\text{cov}(y_i, r_i^*)}{\text{cov}(y, r^*)} = w_i G_i \beta_i$$

$$\sum_i w_i \frac{G_i}{G} \beta_i = \sum_i w_i \beta_i = 1$$

w_i = share of source i in average income,

G_i = Gini coefficient of income source i

β_i = correlation of income source to overall inequality relative to correlation of income source to within source inequality.

β_i = relative concentration coefficient

If $\beta_i > 1$, i -th source increases inequality.

If $\beta_i < 1$, i -th source decreases inequality.

$w_i \beta_i$ = share of total inequality contributed by income source i .

Example: Decomposition of inequality measures, Egypt, 1986-87

		Agriculture	Non-Agriculture	Residuals	Total
Weight of income source	$w_j = Y_j/Y$	0.272	0.808	0.008	1.000
Decomposition of coefficient of variation					
Overall CV	CV				0.800
Decomposition of CV	$\sum w_j CV_j$	0.287	0.880	1.940	
Relative concentration coefficients CV	$w_j^2 CV_j^2 / CV^2$	0.401	0.220	0.110	
Decomposition of CV	$\sum w_j^2$	0.009	0.270	0.822	1.000
Decomposition of Gini coefficient					
Gini of income source	G_j	0.230	0.870	0.830	
Ratio of concentration	R_j	0.858	0.142	0.000	
Overall Gini	G				0.800
Relative concentration coefficients Gini	$w_j^2 R_j G_j^2$	0.004	0.800	0.200	
Decomposition of Gini	$\sum w_j^2$	0.800	0.177	0.023	1.000

Source: K. Adnan, IFPRI Research Report No. 88, 1991.

Goals to note:

- Role of w_j : Agricultural is the most important source of income.
- Role of R_j : Residuals ($R_j > 1$) contribute to increase total inequality; non-agriculture ($R_j < 1$) contributes to reduce total inequality; agriculture is about neutral (R_j near 1).
- Role of G_j : Residuals have the highest scores Gini (or few households get them), and they are very large.
- Role of R_j : Residuals income is highly correlated to total inequality, increasing inequality.

Conclusion:

- Agriculture is also the biggest contribution to inequality (50.6%, as summed by $w_j R_j$) due to its high income share (w_j). Residuals contribute 27.5% of total inequality in spite of its low income share because it has a large Gini (G_j) and a high correlation with overall income inequality (R_j).

3. Relationship between level of income (GNPpc) and inequality: Empirical evidence on the Kuznets curve (inverted-U).

From cross section data (relationship reflects the "Latin America effect")

Kuznets, AEP, 1955.

Pandorf, International Labor Review, 1975. 88 countries. Confirms Kuznets inverted U.

Akronis, IDE, 1978. 80 countries. Confirms Kuznets.

Adelman and Proulx, Economic Applications, 1994. Confirms Kuznets, but weakening between the 1970s (growth) and the 1980s (debt crisis and recession).

Jin, World Development, 1998. Confirms Kuznets.

Ansard and Kanbur, Journal of Development Economics, 1995. Reject Kuznets based on choice of functional form.

From time series data for each country:

Borjas, World Development, 1997. Rejects Kuznets.

From panel data (time series data across countries)

Deininger and Squire, World Bank Economic Review, 1998; IDE, 1998. Work with panel data and country fixed effects. Reject Kuznets.

Conclusion: Does not seem to hold.

Policy implications:

If holds: Growth takes care of inequality.

If does not hold: Need special policy interventions to reduce inequality.

4. Role of GDPpc growth on inequality

- Growth is neutral on inequality: Dollar and Kraay (2000); Deininger and Squire. Elasticity of income of poor with respect to aggregate income = 1. Is this pro-poor growth?
- de Laney and Rodrik (1999) for Latin America: growth does not reduce inequality, but recession increases inequality creating a catchup effect. Hence, importance of "socially responsible macroeconomic" to avoid the social costs of instability (Lantier and Kanbur).



5. Role of inequality on growth: six causal channels

i) Good for growth if inequality increases the aggregate rate of savings (and hence the rate of investment).

- Keynes: Marginal propensity to consume falls with income level. Hence, greater inequality leads to a greater aggregate level of savings and greater investment in physical capital.

- But newer empirical evidence shows that poor people can have high rates of savings (in particular because high levels of risk aversion and the need to self-insure require them to hold large amounts of savings) if they have access to effective savings instruments (financial services).

ii) If there are market failures, equality (income distribution) is related to efficiency (growth), i.e., the non-separability theorem.

- Bad for growth if there is an inverse relation between asset concentration (e.g., farm size) and productivity (yields), then asset redistribution increases efficiency and growth. This inverse relation can come from labor market failures: family labor on small farms is cheaper as it is the residual claimant on effort.

- However, capital market failures may imply a positive relationship between asset concentration and productivity (collateral needed to access credit). In this case, the inverse relation (labor market failure) can be cancelled by a second market failure (capital market failure) (Kuznetsov and Morris, AEP 1997).

iii) Political economy and voting patterns: If high inequality and democracy, the median voter is poor and wants high taxation. The higher inequality is, the more a median income is to the left of average income, and the greater political pressures are to use taxation to redistribute income. Expectation of redistributive taxation on income total savings discourages savings and investment, thus slowing down growth (Patterson and Tobalini, AEP 1994).

iv) Access to financial capital: Capital markets are imperfect: collateral is needed to access credit markets. Hence, those without collateral are locked out of the credit market. With high inequality in asset ownership, good projects of poor entrepreneurs are left unfinanced. As a result, inequality reduces growth.

v) Inequality reduces aggregate investment in human capital. This is because poor people will be constrained in investing in education. Thus rising inequality decreases aggregate investment in education and increases aggregate investment in physical capital. If growth is driven by human capital, inequality is detrimental to growth.

vi) Inequality reduces investment and effort: Inequality increases political instability which reduces investment and growth (and investment climate, which deters FDI and FPI).

Inequality creates feelings of unfairness that reduce incentives to work and induce sabotage and crime (destruction of property) (Mirrlees on tunnel effect, labor unfairness and sabotage).