Income Inequality

Atkinson's Inequality Measure

Atkinson (1970) has proposed another class of inequality measures that are used from time to time. This class also has a weighting parameter ε that measures aversion to inequality. As ε rises, the index becomes more sensitive to transfers at the lower end of the distribution and less sensitive to transfers at the top. In the limit case, ε→ 0, the index reflects the Function of Rawls which only takes into account transfers to the very lowest income group; at the other extreme, when ε=0, we obtain the linear utility function. This ranks distributions solely according to total income. The Atkinson class is defined as:

$$A_\varepsilon = 1 - \left[\frac{1}{N}\sum_{i=1}^{N}\left(\frac{y_i}{\bar{y}}\right)^{1-\varepsilon}\right]^{\frac{1}{1-\varepsilon}} \quad ,\varepsilon \neq 1$$

$$A_e = 1 - \frac{\prod_{i=1}^{N}\left(y_i^{\left(\frac{1}{N}\right)}\right)}{\bar{y}} \quad ,\varepsilon = 1$$

Source: Atkinson, A. B.: "On the Measurement of Inequality". Journal of Economy Theory 2, 244-263 (1970).

Decile Dispersion Ratio

A simple and popular measure of inequality is the decile dispersion ratio, which presents the ratio of the average income or consumption of the richest 10 percent (for instance, the 90th percentile) by that of the poorest 10 percent (the 10th percentile). This ratio is readily interpretable by expressing the income of the rich as multiples of that of the poor. However, it ignores information about incomes in the middle of the income distribution and doesn’t use information about the distribution of income within the top and bottom deciles or percentiles.

Generalized Entropy Measures

Among the most widely used are the Theil indexes and the mean log deviation measure. Both belong to the family of generalized entropy (GE) inequality measures. The general formula is given by:

$$GE(\alpha) = \frac{1}{\alpha(\alpha-1)}\left[\frac{1}{N}\sum_{i=1}^{N}\left(\frac{y_i}{\bar{y}}\right)^{\alpha} - 1\right]$$

where *y* is the mean income per person (or expenditure per capita). The values of GE measures vary between zero and infinity, with zero representing an equal distribution and higher values representing higher levels of inequality.

The parameter α in the class represents the weight given to distances between incomes at different parts of the income distribution, and can take any real value. For lower values of α, GE is more sensitive to changes in the lower tail of the distribution, and for higher values GE is more sensitive to changes that affect the upper tail. The most common values of α used are 0, 1, and 2. *GE(1)* is Theil's index, which may be written as:

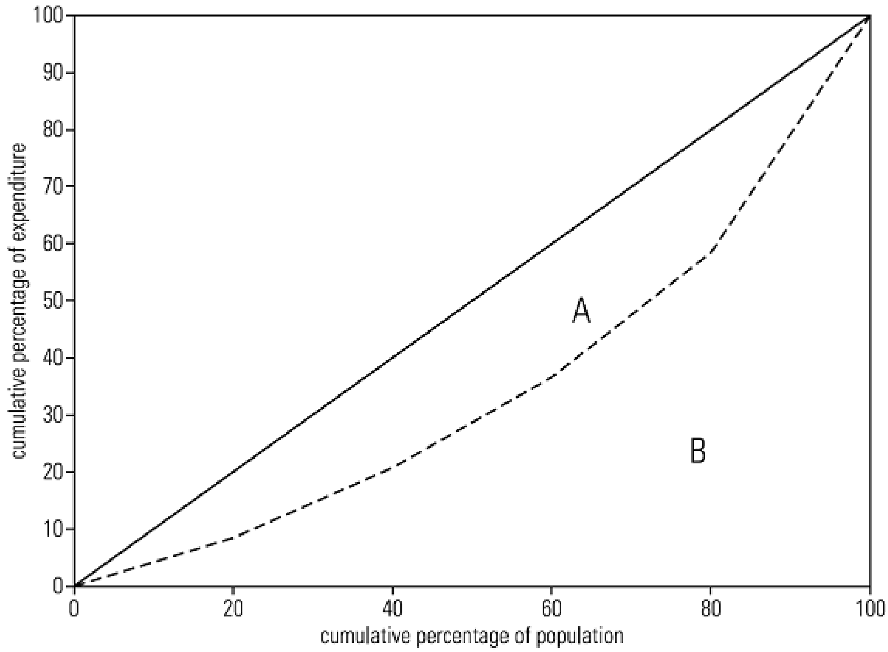
$$GE(1) = \frac{1}{N}\sum_{i=1}^{N}\frac{y_i}{\bar{y}}\,ln\left(\frac{y_i}{\bar{y}}\right)$$

GE(0), also known as the mean log deviation measure, is given by:

$$GE(0) = \frac{1}{N}\sum_{i=1}^{N}ln\left(\frac{y_i}{\bar{y}}\right)$$

Gini coefficient

The most common measure of inequality is the Gini coefficient. It is based on the Lorenz curve, a cumulative frequency curve that compares the distribution of a specific variable (for example, income) with the uniform distribution that represents equality. To construct the Gini coefficient, graph the cumulative percentage of households (from poor to rich) on the horizontal axis and the cumulative percentage of income (or expenditure) on the vertical axis. The Gini coefficient is defined as A/(A + B), please see the figure below for reference. If A = 0, the Gini coefficient becomes 0, which means perfect equality, whereas if B = 0, the Gini coefficient becomes 1, which means complete inequality.



Source: Haughton J. and Khandker S. R: "Handbook on Poverty and Inequality." The World Bank.
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