Poverty

Poverty rate

The poverty rate, also known as the headcount index, measures the proportion of the population that is counted as poor.

$$FGT_0 = \frac{N_p}{N}$$

where N_p the number of poor individuals, N is the total population.

Poverty gap

The poverty gap index measures the extent to which individuals fall below the poverty line (the poverty gaps) as a proportion of the poverty line. The sum of these poverty gaps gives the minimum cost of eliminating poverty, if transfers were perfectly targeted.

$$FGT_1 = \frac{1}{N}\sum_{i=1}^{N_p}\left(\frac{z - y_i}{z}\right)$$

where N_p the number of poor individuals, N is the total population, z is the poverty line and y_i is the actual income.

Poverty severity

The poverty severity index combines information on both poverty and inequality. It averages the squares of the poverty gaps relative the poverty line

$$FGT_2 = \frac{1}{N}\sum_{i=1}^{N_p}\left(\frac{z - y_i}{z}\right)^2$$

where N_p the number of poor individuals, N is the total population, z is the poverty line and y_i is the actual income.

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

Decomposition by Income Source

Change in a welfare indicator can be decomposed over two periods of time-space by components of the welfare aggregate. This statistical exercise, based on the Shapley technique, transposes the distribution of the components of the welfare aggregate over time or space.

Let Y be a welfare aggregate

$$Y = f(c_1, c_2, \ldots, c_n)$$

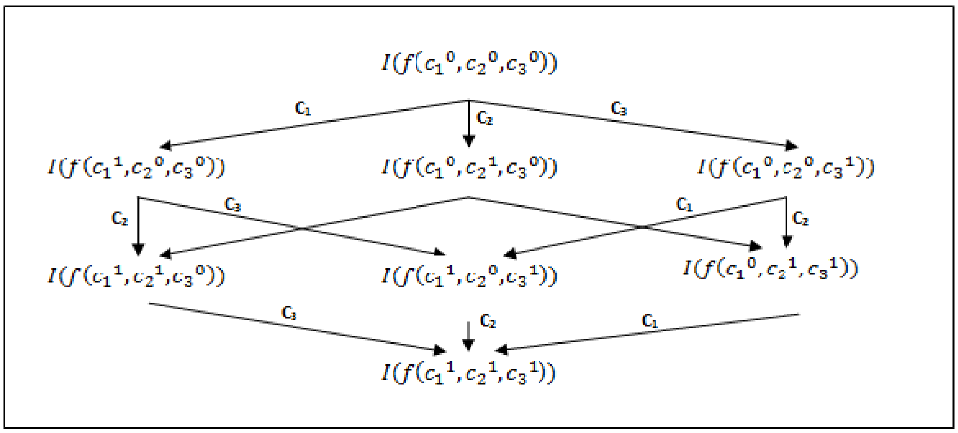
Let *I* be an indicator that can be calculated using Y

$$I = I(Y) = I(f(c_1, c_2, \dots, c_n))$$

Decomposing the change in *I* over two periods of time, *t=0,1,* into *n* contribution, *σi*, attributed to each of the *n* components, such that

$$\sigma_i = I\left(f(c_i{}^{t=1}, .)\right) - I\left(f(c_i{}^{t=0}, .)\right) \quad \forall\, i = 1, \dots, N$$

The Shapely decomposition calculates all *n!* possible ways of decomposing *I* by eliminating each component at once and then taking the average of the contributions of the component.
Example: Structure of a decomposition of 3 components



The goal is to separate the change in an indicator into *n* factors attributed to each individual component, thus the final contribution of the component c_i is going to be determined by the following weighted average:

$$\sigma_i = \sum_{s=0}^{n-1} \sum_{C} \frac{s!\,(n-s-1)!}{n!} \left[I\left(f(c_i{}^{t=1}, C_{n-1,s+1})\right) - I\left(f(c_i{}^{t=0}, C_{n-1,s})\right) \right]$$

Where *s* indicates how many components have already been changed from period 0 to period 1, and *C* denotes all the combinations of the other *n-1* components that have already changed from *t=0 to t=1.*

Decomposition of Growth and Inequality

Changes in poverty can be decomposed into changes due to economic growth (or mean income) in the absence of changes in inequality (or income distribution), and changes in inequality in the absence of growth. Denoting by *P(μt, Lt)* the poverty measure corresponding to a mean income in period *t* of *μt* and a Lorenz curve *Lt* , the decomposition is:

$$\Delta P = [P(\mu_2, L_\pi) - P(\mu_1, L_\pi)] + [P(\mu_\pi, L_2) - P(\mu_\pi, L_1)] + R$$

The first component is the change in poverty that would have been observed if inequality had remained unchanged, while the second component is the change that would have been observed if inequality had changed while the mean income remained the same. The last component is a residual. As a check for consistency, the addition of the change due to growth, the change due to inequality and the residual should equal the change in poverty that is being measured.

Source: Datt, G. and Ravallion, M. (1992) "Growth and Redistribution Components of Changes in Poverty Measures: A decomposition with applications to Brazil and India in the 1980s" Journal of Development economics, 38: 275-296
Web link: click here