Polarisation indices

THE FOSTER-WOLFSON INDEX (1994)

Denote the Foster-Wolfson index of polarisation for the group k by Wolf(k). It can be expressed as follows:

$$\text{Wolf}(k) = 2\left[2\left[0.5 - L(k, 0.5)\right] - I_2(k)\right]\frac{\mu(k)}{Q(k, 0.5)}$$

or as

$$\text{Wolf}(k) = \frac{\hat{\xi}(k;\rho = 2) - 2GL(k, p = 0.5)}{Q(k, p = 0.5)}$$

Where:

$\xi(\rho)$: The Gini social welfare Index
$GL(p)$: The Generalized Lorenz Curve
$Q(p)$: The Quantile function
$I_2(k)$: The Gini index of inequality

To compute the Foster-Wolfson index for one distribution:
- From the main menu, choose the following item: "Polarisation ⇒ Wolfson index".
- Choose the different vectors and values of parameters.

Among the buttons, you will find the following commands:

COMPUTE: to compute the Foster-Wolfson index.

THE DUCLOS, ESTEBAN & RAY INDEX (2003)

Denote the Duclos, Esteban and Ray (DER) index of polarisation for the group k by $\text{DER(k,}\alpha\text{)}$. It can be expressed as follows:

$$\text{DER}(k, \alpha) = \iint f(k, x)^{1+\alpha} f(k, y)\left|y - x\right| dydx$$

where f(k;.) denotes the density function for group k. The discrete formula that is used to estimate this index is as follows:

$$\text{DER}(k, \alpha) = \frac{\sum_{i=1}^{n} sw_i^k f(k, y_i)^{\alpha} a(k, y_i)}{\sum_{i=1}^{n} sw_i^k}$$

where:

$$a(k, y_i) = \hat{\mu}(k) + y_i \left(\left(\frac{2 \sum_{j=1}^{i} sw_j^k - sw_i^k}{\sum_{i=1}^{N} sw_i^k} \right) - 1 \right) - \left(\frac{2 \sum_{j=1}^{i-1} sw_j^k y_j + sw_i^k y_i}{\sum_{i=1}^{N} sw_i^k} \right)$$

The Gaussian kernel estimator is used to estimate the density function.

REMARK: $DER(\alpha = 0) = 2I_2$

To compute the DER index of polarisation, follow these instructions:

- From the main menu, choose: "Polarisation ⇒ Duclos, Esteban & Ray".
- Choose the different vectors and values of parameters.

Parameters

alpha — Compulsory

Among the buttons, you will find the following commands:

COMPUTE: to compute the social welfare DER index index.