U-3 Dev. Eco.

## Axioms / Properties of poverty measure :-

(1) Principle of symmetry :- it implies poverty estimate should not be effected by who is poor to

(2) Replication in variance :- It implies that poverty estimate should not be depend on population size.

(3) Scale in variance :- It implies that if poverty line & per capita income changes by same proportion then the estimate shall not change.

(4) Transfer principle (Pigou-dalton principle) :- It requires that a progressive transfer among the poor shall be depicted by a fall in the value of estimate signifying decrease in poverty intensity.

(5) Focus principle :- It requires that the poverty estimate shall not be effected by the alteration of non poor person.

(6) Monotonicity :- It implies that if the income of a poor person falls then the estimate should record an increase in its value signifying the increase in the intensity of the poverty.

(7) Sub group consistency :- It requires that if the income of a sub-group of a population falls keeping the income of all other sub-group constant than the poverty estimate shall ~~resist~~ indicate a increase in the poverty level by registering the increase in the value of poverty estimation.

(8) Additive decomposibility :- It requires that overall poverty level to be derived by the weighted sum of the sub group where weight indicates population share of each group

# Foster - Green - Thorbecke (FGT) poverty measure (1984)

This measure is used to derrive 3 index of poverty viz Headcount ratio, poverty gap, sq. poverty gap

The process of deriving following indices ~~on~~ follows ↓

Let us consider. The income distribution as

$$y_i = y_1, y_2 \ldots y_n$$

& poverty line indicated as 'z'

Step-1 :- Calculate normalize poverty gap ($G_i$) as followes

$$G_i = \frac{z - y_i}{z} \text{ if } y_i < z$$

$$= 0 \text{ if } y_i \geq z.$$

Step-2 :- Rais the value of $G_i$ to the powen $\alpha$ ($G_i^{\alpha}$) where

$$\alpha = 0, 1, 2.$$

Step-3 :- Poverty estimate can be obtain as follows.

$$P_i = 1/n \sum_{i=1}^{n} G_i^{\alpha}$$

~~$G_i = \frac{z - y_i}{z}$~~

Let $y_i = 4\ 6\ 10\ 12$ & $z = 8$

$$G_i = \frac{z - y_i}{z}$$

$$G_i = 0.5, 0.25, 0, 0$$

Finding head count ratio

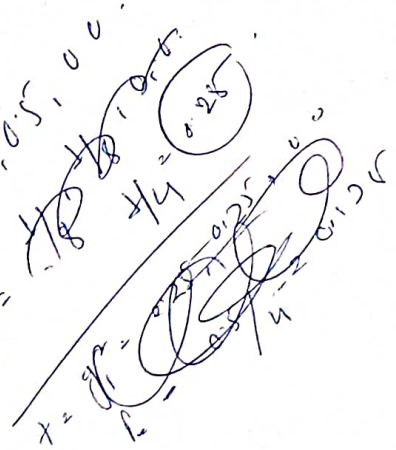
$$G_i^0 = 1, 1, 0, 0$$

$$P_0 = \frac{\sum_{i=1}^{4} g_i^0}{n} = \frac{2}{4} = 0.50$$

## finding poverty gap

$G_i^1 = 0.5, 0.25, 0, 0$

$P_1 = \frac{\sum_{i=1}^{4} G_i^1}{n} = \frac{0.75}{4} = 0.19$



## Finding sq. poverty gap.

$G_i^v = 0.25, 0.062, 0, 0$

$P_2 = \frac{\sum_{i=1}^{4} G_i^v}{n} = \frac{0.312}{4} = 0.078$

→ depth of poverty

## Testing head count ratio for monotonicity.

$Y_i = 4, 4, 10, 12 \quad , Z = 8$

$g_i = 0.5, 0.5, 0, 0$

$G_i^0 = 1, 1, 0, 0$

$P_0 = \frac{\sum G_i^0}{n} = \frac{2}{4} = 0.50$ { ∴ $P_0$ doesnot satisfy monotonicity

## Testing of transfer principal

→ Distribution of poverty

$Y = 4 \quad 6 \quad 10 \quad 12$

$Y_i = 5, 5, 10, 12$

$g_i = \frac{3}{8}, \frac{3}{8}, 0, 0$

$G_i^0 = 1, 1, 0, 0$

$P_0 = \frac{\sum G_i^0}{n} = \frac{2}{4} = 0.50$ { $P_0$ doesnot satisfy transfer principal

0.50 $\frac{6}{8}^3 \times \frac{1}{16} = \frac{3}{16}$

## Testing poverty gap for monotonicity

$y_i = 4, 6, 10, 12$

$y_i = 4, 4, 10, 12$

$g_i' = 1/2, 1/2, 0, 0$ (It satisfy monotonicity)

$P_1 = \frac{\Sigma g_i'}{n} = \frac{1}{4} = 0.25$

## Testing. Poverty gap for transfer principle

$Y = 5, 5, 10, 12$

$g_i = \frac{3}{8}, \frac{3}{8}, 0, 0$

$g_i' = \frac{3}{8}\ \ \frac{3}{8}\ \ 0\ \ 0$

$P_1 = \frac{6}{8}$

$4$

$= \frac{6}{8} \times \frac{1}{4}$

$= \frac{3}{16}$

$= 0.19$ (It doesn't satisfy transfer principle)

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$y_i = 4, 4, 10, 12$

$g_i = \frac{1}{2}\ \ \frac{1}{2}\ \ 0\ \ 0$

$g_i^2 = \frac{1}{4}\ \ \frac{1}{4}\ \ 0\ \ 0$

$P_2 = \frac{\Sigma g_i}{n} = \frac{\frac{2}{4}}{4} = \frac{2}{4} \times \frac{1}{4} = \frac{2}{16}$

## Inequality axioms :- Giovani & Liberati (2006)

Every inequality index shall satisfy following properties called axioms.

1) **Scale invariance** :- It implies that the measure of inequality shall be independent of the change of scale of the income of the population.

2) **Transfer principle** :- If there is a progressive transfer of income then the income inequality index shall depict a decrease in the intensity of income inequality by registering fall in its value.

3) **Principle of population** :- It requires that the inequality index shall remain unchanged if the population grows & the individuals are replicated exact same amount of income

4) **Decomposibility** :- It requires that the oven all inequality index shall be formed by the sum of the inequality index of all the sub groups of population.

5) **Translation invariance** :- It requires that the inequality index shall remain unchanged if all the individual recieve the same absolute amount of additional income in the income distribution.

Gini coeff. satisfy transfer principle, scale invariance & principle of population. ✱