A dual index of income inequality for Albanian households

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INTRODUCTION

- Since household income drives consumption and savings, *income inequality is one of the main components of economic inequality (Welch,1999).*
- Income inequality is extensively measured by the Gini coefficient index.
- The "standard" measures based on consumption and household income or on income aggregates have several shortcomings, specifically related to normalization, low dimensionalism and ad hoc weights (*Park et al., 2017*).

Aim:

To **introduce an alternative method besides the Gini coefficient** to measure income inequality for Albanian households, applying two distribution indexes to what is called Uniformely Distributed (UD) Income:

the Rawlsian index and the **Gini dispersion index** as a decomposition of the Gini coefficient,

on income micro data for **16055 households**.

METHODOLOGY (I)

Let's assume a population of **n individuals**.

The income distribution of this population is given through the vector $y = (y_1, y_2, \dots y_n)$,where $y_1$is the income of the *i*-th household. Without loss of generality, we can assume that the individual incomes are ordered, i.e $y_1 \leq y_2 \leq \cdots \leq y_n$.

Under these assumptions, the total income of the population and the mean income of the population can be denoted through the two respective formulas: $S(y) = \sum_{i=1}^{n} y_1$and $\mu(y) = S(y)/n$

Following **the methodology of Park et al. (2017)** the UD income distribution of y is defined by $d = (d_1, d_2, \dots, d_n)$, where $d_i = y_i - y_1$. the total UD income is given by the formula: $S(d) = S(y) - ny_1$.

Conversion of $S(d)$ in an index requires a reference magnitude where they use for this purpose $S(y)$as a reasonable reference. Therefore:

Rawlsian Index: $$\frac{S(d)}{S(y)} = \frac{\mu(d)}{\mu(y)} = 1 - \frac{y_1}{\mu(y)} \qquad (1)$$

METHODOLOGY (II)

Gini coefficient*: $G(y) = \frac{\sum_{i=1}^{n}\sum_{j\geq i}^{n}|y_i - y_j|}{n(n-1)\mu(y)} = \frac{\mu(d)}{\mu(y)} = \frac{\sum_{i=1}^{n}\sum_{j\geq i}^{n}|d_i - d_j|}{n(n-1)\mu(d)} = R(d|y)G(d)$ (2)

While its distribution is denoted as: $\mu(d_i) = (d_{n-i+1} - d_{n-i+1}, d_{n-i+2} - d_{n-i+1}, \dots, d_{n+} - d_{d-i+1})$

Then $d = d_n$ and $d = \mu(d)$. We can derive:

Gini dispersion index:

$$G(d) = G(d_n) = \sum_{i=2}^{n} w_i \frac{\mu(d_i)}{\mu(d_n)} R(u(d_i)|d_i), \quad (3)$$

$$\text{where } u(d_n) = d_n, R(u(d_n)|d_n) = 1 \; and$$

$$w_i = \begin{cases} (\prod_{j=1}^{n} \frac{n-j-1}{n-j+1}) \frac{i}{i-1}, if \; i = 2,3 \dots, (n-1) \\ \frac{1}{n-1}, if \; i = n, \end{cases}$$

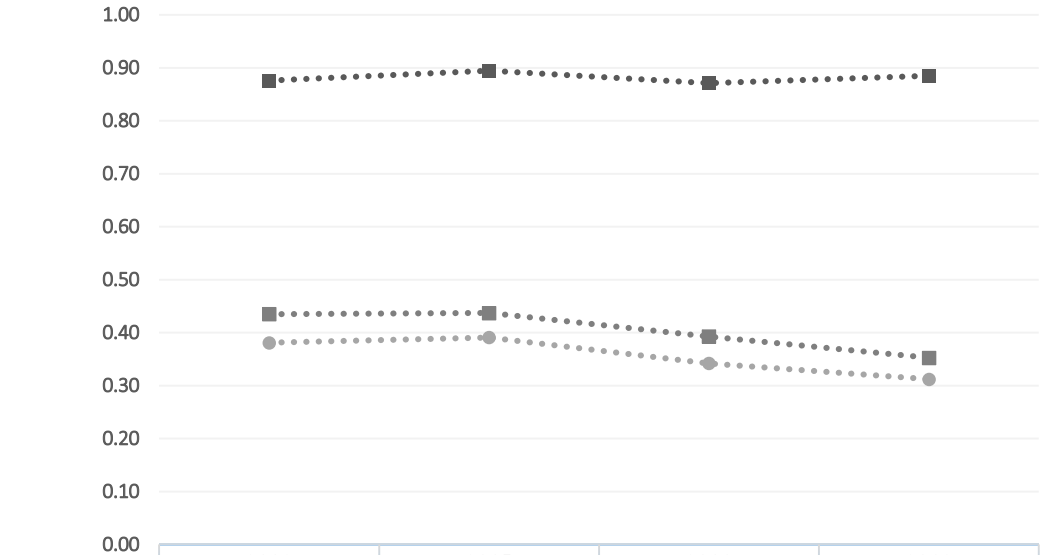
*The Gini coefficient can be decomposed to the Rawlsian and Gini dispersion index for incomes strictly larger than 0.

DATA

- Data on **household-level income** covering 17,000 households from the Living Standard Measure Survey (LSMS) of **2002, 2005, 2008 and 2012**.
- The four samples are considered by INSTAT representative of the population at the national, regional and urban / rural level. The raw sample consists of 17121 households.
- The income variables:
  - **Annual income** = self-reported total monthly income x12
  - **Annual income per capita =**self-reported total monthly income x12 per capita
- *It is clear that UD income should be non-negative and should be zero.* One advantage of the approach on income of Park et al. (2017), using the concept of UD income, is that a non-positive income correction is not needed for obtaining unbiased and significant results.
- We have dropped all households who's head<25 years old and >85years old; households who have >8 members.
- The final sample consists of **16055 households.**

RESULTS (I)

Chart 1. Rawlsian, Gini Dispersion Index and Gini Classic Coefficient.



	2002	2005	2008	2012
G(y)	0.381	0.391	0.342	0.312
R(d|y)	0.876	0.894	0.871	0.885
G(d)	0.435	0.437	0.393	0.353

Source: Authors Calculations, LSMS (2002-2012)

The Rawlsian index is almost constant over time, fluctuating in the range between **0.87-0.90** close to the value of 1.

The Gini coefficient and the Gini dispersion index **move together** over the years, this being more prominent in 2012.

The Gini classic coefficient in 2008 and 2012 **has not decreased as a result of the decrease of the magnitude of inequality**, but **as a result of the redistribution of income among households in the UD distribution.**

The results obtained using the per capita income variable are **conforming to** the results obtained from the non-per capita variable.

RESULTS (II)

Table 1: Inequality indexes by percentiles 5, 25, 50, 75, 95.

2002			
	G(y)	**R(d|y)**	**G(d)**
<5p	0.06	0.549	0.109
<25p	0.08	0.738	0.108
>75p	0.218	0.411	0.53
>95p	0.206	0.325	0.634
<50p	0.159	0.738	0.215
>50p	0.277	0.509	0.544
2005			
	G(y)	**R(d|y)**	**G(d)**
<5p	0.176	0.779	0.226
<25p	0.208	0.899	0.231
>75p	0.277	0.482	0.575
>95p	0.235	0.381	0.616
<50p	0.245	0.935	0.262
>50p	0.335	0.586	0.571
2008			
	G(y)	**R(d|y)**	**G(d)**
<5p	0.055	0.529	0.104
<25p	0.122	0.677	0.180
>75p	0.21	0.359	0.585
>95p	0.208	0.348	0.597
<50p	0.164	0.756	0.217
>50p	0.244	0.543	0.449
2012			
	G(y)	**R(d|y)**	**G(d)**
<5p	0.05	0.471	0.106
<25p	0.103	0.617	0.167
>75p	0.172	0.667	0.257
>95p	0.13	0.322	0.41
<50p	0.15	0.706	0.212
>50p	0.21	0.437	0.48

Source: Author's Calculations, LSMS 2002-2012

Inequality is more pronounced at the top 25% of the income distribution (especially for households at the 75% -95% level), while at the bottom 25% of the distribution, coefficient estimates suggest for a high level of equality.

Households that are in the **> 50%** of income are **more unequal** than those in the <50% (see the first column), as the literature would suggest.

The **magnitude of inequality** is **higher in the bottom of the income distribution** versus the top, and **the opposite occurs** for the distribution of inequality by the **Gini dispersion index**.

The disaggregated values by the two indexes support the Gini coefficient differences observed between the lower and upper percentiles of the distribution.

FINDINGS AND CONCLUSIONS

- Using micro data from the 2002, 2005, 2008 and 2012 Living Standards Measurement Survey **the article calculates income inequality using a dual index**: **the Rawlsian index**, which measures the magnitude of inequality, and **Gini's dispersion index**, which measures the dispersion of inequality.
- The results suggest for **an added value when using a dual index** in measuring inequality.
- The decomposition of the Gini coefficient suggests that in Albania, **movements in the inequality of the population were a result of the redistribution of the UD income**, whilst the magnitude of inequality has remained almost the same between 2002, 2005, 2008 and 2012.
- Inequality is more pronounced in the upper part of the income's distribution.