

The redistributive impact of growth on opportunities

An Application to Uganda



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Background

In the last decade there has been a renewed interest on the study of the relationship between economic inequality and growth. While the macro oriented literature has investigated the *inequality-to-growth* direction of this link, the micro-approach focused on the *growth-to-inequality* direction to understand what is the impact of development dynamics on inequality. Our paper represents a contribution to this latter approach: we propose a set of tools to evaluate the effect of growth on inequality focusing on a specific type of inequality: inequality of opportunity (IOP).

Our starting point is the *Growth Incidence Curve* (GIC), proposed by Ravallion and Chen (2003). The GIC plots the mean income growth of each percentile in the distribution of income and allows to compare the incidence of growth (or contraction) in poorer segments of the population with that of richer segments. To estimate a GIC is much more informative than to estimate the change in any scalar inequality index, because, as discussed by Ferreira (2011) for a large number of inequality indices “changes in inequality are ultimately just different ways of aggregating the information contained in the GIC.” p. 14.

Peragine et al. (2013) proposed two modified GIC able to evaluate the impact of growth on the distribution of opportunity. These curves have been shown to be consistent with only a possible definition of equal opportunity: the so called *ex ante* approach. We propose two new opportunity-GICs which are shown to be consistent with the alternative approach to measure IOP: the *ex post* approach. We use the widened set of tools to evaluate the redistributive effect of growth in terms of opportunity in Uganda between 2009 and 2011.

Main Objectives

1. Discuss how the Opportunity Growth Incidence Curves (OGIC) proposed by Peragine et al. (2013) may be incompatible with different definitions of equal opportunity.
2. Propose two new OGICs to obtain a set of tools able to evaluate the effect of growth on opportunities consistently with the two most used approaches to measure IOP.
3. Exploit the first two waves of the Uganda National Panel Survey (UNPS 2009/10-2010/11) to evaluate whether fast economic growth and dramatic inequality increase were also coupled with rising IOP in Uganda.

Methods

The standard micro-approach to evaluate the effect of economic growth on inequality is the GIC:

$$g(p) = \frac{y_{t+1}(p) - y_t(p)}{y_t(p)}, \text{ for all } p \in [0, 1] \quad (1)$$

The GIC considers only one individual characteristic, the rank of her income at each point in time, and it is used to assess the progressivity/regressivity of growth.

We are interested in applying the same approach to the space of opportunities. An Opportunity-GIC should evaluate individual outcome changes considering two distinct sets of traits: circumstances beyond individual control (that define her opportunity set) and individual choices (that cause ethically inoffensive inequality).

These traits determine a partition of the population in *types*, sets of individuals sharing same circumstances, and *tranches*, sets of individuals exerting the same choice (degree of effort), as shown in matrix (2):

$$Y^t = \begin{matrix} & \text{effort 1} & \dots & \text{effort j} & \dots & \text{effort m} \\ \text{type 1} & y_{11} & \dots & y_{1j} & \dots & y_{1m} \\ \dots & \dots & \dots & \dots & \dots & \dots \\ \text{type i} & y_{i1} & \dots & y_{ij} & \dots & y_{im} \\ \dots & \dots & \dots & \dots & \dots & \dots \\ \text{type n} & y_{n1} & \dots & y_{nj} & \dots & y_{nm} \end{matrix} \quad (2)$$

In such a framework there are two main approaches to evaluate equality of opportunity (EOP):

ex ante EOP: “There is EOP if the value of the opportunity set of all types is the same \Rightarrow IOP is outcome inequality between types.”

ex post EOP: “There is EOP if all those who exerted the same degree of effort have the same outcome \Rightarrow IOP is inequality within tranches.”

Peragine et al. (2013) adopted an *ex ante* approach to measure IOP and proposed two curves to answer two questions:

(a) are different circumstances beyond individual control associated with different levels of growth?

type OGIC: plot type specific rate of growth

(b) What is the effect of growth on the distribution of opportunity?

Individual ex ante OGIC: apply the GIC to the distribution of ex ante opportunities (distribution of types’ opportunity set)

Compensation consistent OGICs

The main shortfall of the type OGIC and ex ante OGIC is their inconsistency with the ex post principle of EOP. However, we show that it is possible to construct two symmetric curves, *ex post Opportunity Growth Incidence Curve* (ex post OGIC) and *class Opportunity Growth Incidence Curves* (class OGIC), that answer to questions (a) and (b) looking at IOP in an ex post perspective.

For any outcome distributions $Y^t, Y^{t+1} \in \mathbb{R}_+^N$ we first substitute the outcome of individuals of type i and exerting effort j with the mean outcome of her cell (set of those in the same type and tranche): $\mu_{i,j}^t$ and then we rescale it as follows: $\hat{y}_k^t = \frac{\mu_{i,j}^t}{\mu_k^t} \mu_k^t$, where μ_k^t is the mean outcome of tranche k . The ex post OGIC is then obtained as:

$$g_{Y_{EOP}}^o \left(\frac{k}{N} \right) = \frac{\hat{y}_k^{t+1}}{\mu_k^t} - 1, \forall k = 1, \dots, N \quad (3)$$

It is easily shown that a decreasing ex post OGIC means that growth has been opportunity equalizing, an increasing curve means that growth has been regressive in terms of IOP.

Because from an ex post point of view to focus on types is unsatisfactory in all cases in which the advantage of belonging to a type is not the same across tranches, a natural question is to ask whether it is also possible to construct an ex post version of the type OGIC.

This is possible first defining groups of individuals that correspond to types in the ex post approach, the *classes*, and then tracking their outcome change across time obtaining the *class OGIC*.

Classes are obtained as suggested by (Fleurbaey and Peragine, 2014) starting from the original distribution of matrix (2) and permuting each columns such that the rows dominate each other. We call the rows of this new distribution “classes” and can be interpreted as the group of individuals in the same initial position in terms of ex post opportunity.

To construct the class OGIC we first order class means in ascending order $\mu_1^t \leq \dots \leq \mu_k^t \leq \dots \leq \mu_n^t$ for both distributions Y^t, Y^{t+1} and then obtain the *class OGIC* with the formula:

$$g_{Y_{EOP}}^o \left(\frac{i}{n} \right) = \frac{\mu_i^{t+1}}{\mu_i^t} - 1, \forall i \in \{1, \dots, n\} \quad (4)$$

The class OGIC plots, against each class, the variation of mean outcome of that class. It is negatively (positively) sloped if the initially disadvantaged classes get higher (lower) benefit from growth than those initially advantaged.

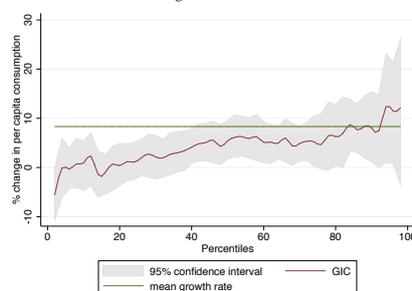
Growth and inequality of opportunity in Uganda

We apply the four curves proposed to show how growth affected the degree of IOP in Uganda between 2009/10 and 2010/11. The case of Uganda is interesting because it has recently experienced both rapid economic development and increasing inequality.

We exploit the first two waves of the Uganda National Panel Survey (UNPS) from which we select a subsample of adults (household heads and their spouse). The outcome considered is per capita household yearly consumption. Among possible circumstances beyond individual control we select two innate characteristics considered particularly relevant in the history of the economic development of Uganda: rural/urban area of birth and ethnicity. We obtain a partition of the samples into 26 types with a minimum number of observations of 29 (Iteso born in urban area).

We then estimate the set of curves for per capita consumption in Uganda. Between 2009/10 and 2010/11 per capita consumption increased by over 8% in nominal terms however the distributive effect of growth was clearly regressive as shown in the GIC. Aggregating the GIC coordinates we obtain an increase in total inequality close to the 10% (mean logarithmic deviation was 0.41 in 2009/10 and 0.45 in 2010/11).

figure 1: GIC

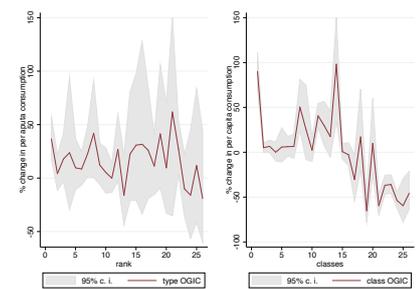


The type OGIC shows no clear trend: among best performing types we find group with very poor initial condition such as member of Langi born in rural areas (+36%) and groups with relatively good initial condition such as Batoro born in urban areas (+46%).

The interpretation of class OGIC is even more complex because each class could contain individual belonging to different types depending on the tranche considered. In our sample:

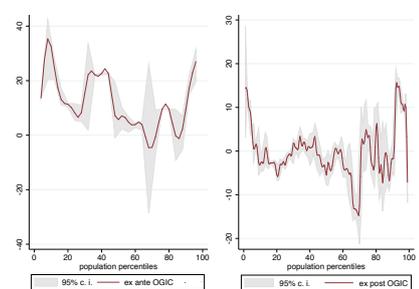
- a lot of re-ranking takes place between types (in 18 over 26 classes);
- the class OGIC is decreasing in classes suggesting that, when initial effort conditions are considered, worse off classes have benefited more from growth than better off classes.

figure 2: Type OGIC & Class OGIC



Ex ante OGIC, if we exclude the very best of types, shows a decreasing pattern, this means that the distribution of ex ante opportunities in Uganda is more equal in 2010/11 than it was in 2011/12. The ex post OGIC instead does not show a clear trend: the curve is decreasing for the first 60 percentiles and then increasing suggesting that how benefited more from growth where those that occupied the very worst off and very better off position in the distribution of opportunities. However, both ex ante and ex post IOP declined when measured as share of total inequality due to opportunities (from 29.36% to 24.18% and from 25.12% to 24.42% respectively).

figure 3: ex ante OGIC & ex post OGIC



Conclusions

- It is possible to modify the Growth Incidence Curve to evaluate the redistributive effect of growth on the distribution of opportunities.
- We complemented the set of existing opportunity-GICs to make possible to evaluate the effect of growth on IOP consistently with a wider definition of equal opportunity.
- We apply these tools to the distribution of opportunities in Uganda showing that, although inequality greatly increased between 2009 and 2011, the share of total inequality due to opportunity clearly declined in the same period.

Forthcoming Research

We will extend our analysis in two main directions: *i)* considering partition in types based on different set of circumstances, *ii)* applying the same type of analysis to other Sub-Saharan African countries (Tanzania, Nigeria).