

The Devil Is in the Details

Growth, Polarization, and Poverty Reduction in Africa in the Past Two Decades

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Abstract

This paper investigates the distributional changes that limited pro-poor growth in the past two decades in Sub-Saharan Africa; these changes went undetected by standard inequality measures. By developing a new decomposition technique based on a nonparametric method—the relative distribution—the paper finds a clear distributional pattern affecting

almost all the analyzed countries. Nineteen of 24 countries experienced a significant increase in polarization, particularly in the lower tail of the distribution, and this distributional change lowered the pro-poor impact of growth substantially. Without this change, poverty could have decreased an additional 5–6 percentage points during the past decade.

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The Devil Is in the Details: Growth, Polarization, and Poverty Reduction in Africa in the Past Two Decades

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1 Introduction

Despite experiencing stable and sustained growth over almost two decades, several Sub-Saharan African (SSA) countries have not experienced a commensurate reduction in poverty. The present paper identifies and interprets the distributional changes that occurred in most of these countries, which have offset the positive impact of growth in reducing poverty.

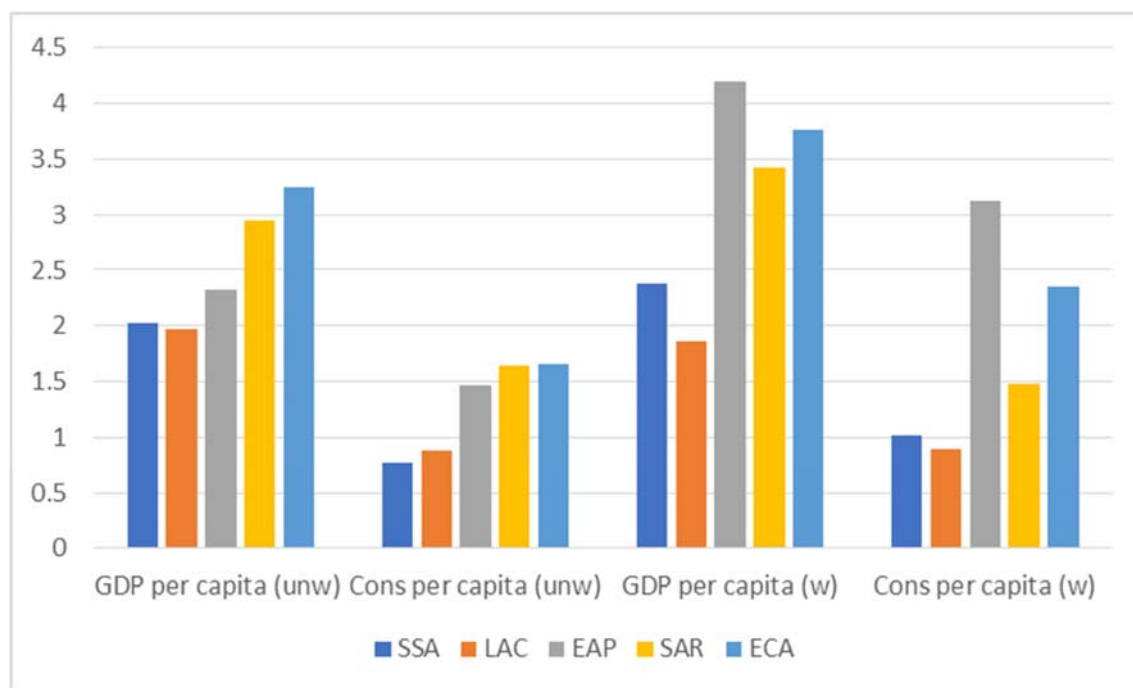
Recent estimates, based on an international poverty line of US\$1.90 (in 2011 PPP U.S. dollars), suggest that poverty declined only by 23 percent between 1990 and 2012 (from 56 percent in to 43 percent) (Beegle et al., 2016). This rate is much lower than those experienced by countries with similar growth rates and similar poverty rates in other regions. World Bank (2018) calculates that in a typical non-African developing country where 50 percent of the population is living below the poverty line, a 1 percent yearly growth in GDP led to a reduction of 0.53 percentage points a year in the incidence of poverty. In contrast, the same 1 percent per capita GDP growth in a typical African country with the same poverty incidence reduced poverty by only 0.16 percentage point.

The explanations for this lower growth poverty-elasticity in Africa are generally two: one questioning the veracity of the recent African economic boom (the so-called African miracle) and another looking at the role of inequality. Jerven (2013, 2015) has provided evidence on the problems afflicting GDP calculations in Africa and argued that for many SSA countries the recent high growth is merely statistical or, in other words, a feature of adding the informal sector that previously was not counted (Jerven, 2015). Since growth is overstated, it is thus not surprising that poverty did not fall so rapidly.

Although this argument has some validity, it does not completely solve the low elasticity puzzle. Figure 1 compares the average annual GDP per capita growth and average consumption² growth from available household surveys; consumption is the welfare measure typically used to calculate poverty rates and growth is the factor that really matters in poverty reduction (Adams, 2004; McKay, 2013). Indeed, the discrepancy between GDP per capita growth and household consumption growth is higher in SSA than in the rest of the developing world, yet SSA registers an average annual growth of household consumption of about 1.02 percent per year, not much lower than the South Asia Region (SAR) and slightly higher than Latin America. Therefore, household consumption increased in SSA not differently from other developing regions but still poverty declined slower.

² For Latin America we computed average income growth for the household surveys.

Figure 1: GDP per capita and household consumption average growth rates: 1999-2014.



Regarding inequality, literature has debated its relation with growth and poverty. Dollar and Kray (2002) show that all income groups tend to benefit proportionally from increases in economic growth and that income distribution does not really matter for poverty reduction. Bourguignon (2003) and Ravallion (2007) find that inequality reduces the poverty-reducing effects of economic growth. Thorbecke (2013) argues that the combination of high endemic poverty and inequality is in general responsible for low growth elasticity of poverty. High initial poverty and inequality reduces directly the growth rate but also indirectly the poverty-reducing effect of this growth. Looking at SSA, Fosu (2009, 2015) finds that economic growth reduces poverty while growth elasticity is a decreasing function of initial inequality. Therefore, the low elasticity registered in SSA in the last two decades could potentially be attributed to an increase in inequality that limited the pro-poor content of growth.

Unfortunately, when measured with standard indicators like Gini, there is no clear evidence of an increase in inequality in the last two decades. Pinhovskiy and Sala-i-Martin (2014) show that the recent SSA growth spurt was, in fact, accompanied by a generalized decrease of inequality. Beegle et al. (2016), analyzing the SSA countries for which there are two comparable surveys, conclude that about half of them experienced a decline in inequality while the other half saw an increase. Cornia et al. (2017) find a bifurcation in inequality trends

in SSA: 17 countries experienced declining inequality, whereas 12 countries, predominantly in Southern and Central Africa, recorded an inequality rise.

At first glance therefore, there is no clear pattern in SSA that can explain through increasing inequalities the low elasticity of poverty. From a distributional point of view, thus, it is still unclear why growth did not translate into greater household consumption at the bottom of the income distribution at rates comparable with those experienced in other regions of the world (Christaensen et al., 2014; Thorbecke, 2013).

The central argument of this paper is that significant distributional changes against poverty reduction have, in fact, taken place in most of the SSA countries we analyze. These changes affected predominantly the lower part of the welfare distribution and went undetected by standard inequality measures. The reason is simple. Summary measures like the Gini do not assign a weight to the different percentiles; if a pro-inequality change in one part of the distribution is more than compensated by a pro-equality change in the rest of the distribution, the Gini will decline. The distributional changes that matter most for poverty reduction, however, are those localized in the lower part of the distribution but can be detected only if we are able to focus on this part only.

To analyze these changes, this paper develops a novel yet simple decomposition based on the “relative distribution” method (Handcock and Morris, 1998, 1999). The strength of this decomposition consists of providing a non-parametric framework for taking into account all the distributional differences that could have affected the variation in the poverty rate and countered the pro poor effect of growth. In this way, it enables to summarize multiple features of the welfare distribution that a standard decomposition based on summary inequality measures would not have detected (Datt and Ravallion, 1992; Kolenikov and Shorrocks, 2005).

The paper is organized as follows Section 2 outlines the distinctive features of the relative distribution approach and presents the proposed decomposition. Section 3 discusses the data and provides summary statistics. Section 4 details the main findings of the study. Section 5 provides summary conclusions.

2 Methodology

2.1 Polarization and relative distribution

Over the last two decades, the issue of polarization has gained increasing importance in the analysis of income distribution (Foster and Wolfson, 1992; Levy and Murnane, 1992; Esteban and Ray, 1994; Wolfson; 1994, 1997) and now it seems to be widely accepted that polarization is a distinct concept from inequality.

A general notion of income polarization (Esteban and Ray, 1994) regards it as “clustering” of a population around two or more poles of the distribution, irrespective of where they are located along the income scale. The notion of income polarization in a multi-group context is an attempt at capturing the degree of potential conflict inherent in a given distribution (see Esteban and Ray, 1999, 2008, 2011). The idea is to consider society as an amalgamation of groups, where the individuals in a group share similar attributes with its members (i.e. have a mutual sense of “identification”) but they are different from the members of the other groups (i.e. have a feeling of “alienation”).

Political or social conflict is therefore more likely the more homogeneous and separate the groups are, that is when the within-group income distribution is more clustered around its local mean and the between-group income distance is longer (see, *inter alia*, Gradín, 2000, Milanovic, 2000, D’Ambrosio, 2001, Zhang and Kanbur, 2001, Reynal-Querol, 2002, Duclos et al., 2004, Lasso de la Vega and Urrutia, 2006, Esteban et al., 2007, Gigliarano and Mosler, 2009, and Poggi and Silber, 2010).

The use of summary measures of income polarization is common in literature. The approach used in this paper, the so-called “relative distribution”, combines the strengths of summary polarization indices with details of distributional change that the kernel density estimate yields. The relative distribution method has been employed by Alderson et al. (2005), Massari (2009), Massari et al. (2009a,b), Alderson and Doran (2011, 2013), Borraz et al. (2013), Clementi and Schettino (2013, 2015), Clementi et al. (2017, 2018), Molini and Paci (2015), Petrarca and Ricciuti (2016), Nissanov and Pittau (2016), and Nissanov (2017).

More formally,³ let Y_0 be the income variable for the reference population and Y the income variable for the comparison population. The relative distribution is defined as the ratio

³ Here we limit ourselves to illustrating the basic concepts behind the use of the relative distribution method. Interested readers are referred to Handcock and Morris (1998, 1999) for a more detailed explication.

of the density of the comparison population to the density of the reference population evaluated at the relative data r :

$$g(r) = \frac{f(F_0^{-1}(r))}{f_0(F_0^{-1}(r))} = \frac{f(y_r)}{f_0(y_r)}, \quad 0 \leq r \leq 1, \quad y_r \geq 0, \quad (1)$$

where $f(\cdot)$ and $f_0(\cdot)$ denote the density functions of Y and Y_0 , respectively, and $y_r = F_0^{-1}(r)$ is the quantile function of Y_0 . When no changes occur between the two distributions, $g(r)$ has a uniform distribution; a value of $g(r)$ higher (lower) than 1 means that the share of households in the comparison population is higher (lower) than the corresponding share in the reference population at the r^{th} quantile of the latter.

One of the major advantages of this method is the possibility to decompose the relative distribution into changes in location and changes in shape. The decomposition can be written as:

$$\underbrace{\frac{f(y_r)}{f_0(y_r)}}_{\text{Overall}} = \underbrace{\frac{f_{oL}(y_r)}{f_0(y_r)}}_{\text{Location}} \times \underbrace{\frac{f(y_r)}{f_{oL}(y_r)}}_{\text{Shape}}. \quad (2)$$

$F_{oL}(y_r)$ is the median-adjusted density function:

$$f_{oL}(y_r) = f_0(y_r + \rho), \quad (3)$$

where the value ρ is the difference between the medians of the comparison and reference distributions—alternative indices like the mean and/or multiplicative location shift can also be considered.

The relative distribution approach also includes a median relative polarization index, which is a measurement of the degree to which the comparison distribution is more polarized than the reference one:

$$MRP = \frac{4}{n} \left(\sum_{i=1}^n \left| r_i - \frac{1}{2} \right| \right) - 1. \quad (4)$$

The values of the MRP index range between -1 and 1: positive values represent more income polarization and negative values represent less polarization; a value of 0 indicates no difference in distributional shape. The MRP index can be additively decomposed into the lower relative polarization index and the upper relative polarization index, which behave similarly as the MRP.

2.2 Decomposition

The relative distribution is a well-established approach to distributional analysis, whereas novel is the polarization-poverty and growth decomposition we develop for showing how the distributional changes we observed in many SSA countries have effectively limited the impact of growth on poverty reduction.

In general terms, poverty $P(z, \mu, L)$ is expressed in terms of poverty line, z , mean income level, μ , and the Lorenz curve, L , representing the structure of relative income inequalities. Assuming the poverty line is fixed at a given level, poverty is given by $P(\mu, L)$. The total change in poverty, ΔP , is then decomposed into two components. The first component is the growth component due to changes in the mean income while holding the Lorenz curve constant at some reference level, and the second is a redistribution component due to changes in the Lorenz curve while keeping the mean income constant at some reference level.

Following Heshmati (2007), one can compute growth and inequality decompositions in various ways. Kakwani and Subbarao (1990) introduced the following decomposition:

$$\Delta P = P(\mu_1, L_1) - P(\mu_0, L_0) = \underbrace{[P(\mu_1, L_0) - P(\mu_0, L_0)]}_G + \underbrace{[P(\mu_1, L_1) - P(\mu_1, L_0)]}_R, \quad (5)$$

where μ and L are mean income and the Lorenz curve characterizing the distribution of income. The subscripts 0 and 1 denote the two (consecutive or non-consecutive) initial and final periods of observation, and G and R are contributions from the growth and redistribution components.

Jain and Tendulkar (1990) suggested an alternative formulation:

$$\Delta P = P(\mu_1, L_1) - P(\mu_0, L_0) = \underbrace{[P(\mu_1, L_1) - P(\mu_0, L_1)]}_G + \underbrace{[P(\mu_0, L_1) - P(\mu_0, L_0)]}_R, \quad (6)$$

which differs from the previous decomposition by the reference point (base year versus final year) that is initially chosen for computation of growth and redistribution components.

Kakwani (2000) suggested a simple averaging of both the growth and inequality components from Equations (5) and (6), which is:

$$\begin{aligned} \Delta P = & \frac{1}{2} \underbrace{\{[P(\mu_1, L_0) - P(\mu_0, L_0)] + [P(\mu_1, L_1) - P(\mu_0, L_1)]\}}_G \\ & + \frac{1}{2} \underbrace{\{[P(\mu_1, L_1) - P(\mu_1, L_0)] + [P(\mu_0, L_1) - P(\mu_0, L_0)]\}}_R. \end{aligned} \quad (7)$$

Datt and Ravallion (1992) found the above decompositions of poverty changes as being time path dependent, arising through and dependent on the choice of reference levels. To make the changes path independent they proposed adding an extra residual E as follows:

$$\Delta P = P(\mu_1, L_1) - P(\mu_0, L_0) = \underbrace{[P(\mu_1, L_0) - P(\mu_0, L_0)]}_G + \underbrace{[P(\mu_1, L_1) - P(\mu_1, L_0)]}_R + E. \quad (8)$$

The residual in (8) can be interpreted as the difference between the growth (redistribution) components evaluated at the terminal and initial Lorenz curves (mean incomes), respectively.

The above decompositions compute the growth and redistribution effects of poverty change through an analysis of mean incomes and relative inequalities. However, results would be different if the analysis is carried out through median incomes and absolute income gaps—as it is in the spirit of the relative distribution approach.⁴ In such an eventuality, the poverty change between two periods, t_1 and t_2 , into growth and redistribution components is decomposed as follows:⁵

$$\underbrace{HCR_{t_2} - HCR_{t_1}}_{\text{Variation}} = \underbrace{(HCR_{t_1}^L - HCR_{t_1})}_{G_1} + \underbrace{(HCR_{t_2} - HCR_{t_1}^L)}_{R_1}, \quad (9)$$

when t_1 is the period of reference, and:

$$\underbrace{HCR_{t_2} - HCR_{t_1}}_{\text{Variation}} = \underbrace{(HCR_{t_2} - HCR_{t_2}^L)}_{G_2} + \underbrace{(HCR_{t_2}^L - HCR_{t_1})}_{R_2}, \quad (10)$$

when t_2 is the period of reference. In the above:

- $HCR_{t_1} = \frac{\sum_{i=1}^N 1(y_i^{t_1} < z)}{N}$: poverty headcount ratio of the first period.⁶
- $HCR_{t_2} = \frac{\sum_{i=1}^N 1(y_i^{t_2} < z)}{N}$: poverty headcount ratio of the second period.
- $\text{Variation} = HCR_{t_2} - HCR_{t_1}$: difference in poverty headcount ratio between t_2 and t_1 .
- $G_1 = HCR_{t_1}^L - HCR_{t_1}$: growth component when t_1 is the period of reference; $HCR_{t_1}^L$ is the poverty headcount ratio of the first period when all incomes $y_i^{t_1}$ of the first period

⁴ On the importance of paying more heed to *absolute* difference as well, rather than to relative difference only, see e.g. Atkinson and Brandolini (2010) and references therein.

⁵ Here, we assume that the headcount ratio is the poverty measure's precise functional form. In Section 5, we shall apply the decompositions to another common poverty measure, the poverty gap index, given by the aggregate income short-fall of the poor as a proportion of the poverty line and normalized by population size, i.e. $PG = \frac{1}{N} \sum_{i=1}^q \left(\frac{z - y_i}{z} \right)$, where q is the number of poor people in the population.

⁶ The “1” indicator at the numerator is a function assuming value 1 if the i^{th} individual has income y below the poverty line z , and assuming value 0 otherwise. Note that N is the size of total population, and not the total number of poor individuals.

are additively shifted by $\rho_1 = m_{t_2} - m_{t_1}$, where m_{t_1} and m_{t_2} are the medians of the two distributions.

- $R_1 = HCR_{t_2} - HCR_{t_1}^L$: redistribution component when t_1 is the period of reference.
- $G_2 = HCR_{t_2} - HCR_{t_2}^L$: growth component when t_2 is the period of reference; $HCR_{t_2}^L$ is the poverty headcount ratio of the second period when all incomes $y_i^{t_2}$ of the second period are additively shifted by $\rho_2 = m_{t_1} - m_{t_2}$, where m_{t_1} and m_{t_2} are the medians of the two distributions.
- $R_2 = HCR_{t_2}^L - HCR_{t_1}$: redistribution component when t_2 is the period of reference.

Taking the average of (9) and (10) yields the following decomposition of the variation in the poverty headcount between the two periods t_1 and t_2 :

$$\underbrace{HCR_{t_2} - HCR_{t_1}}_{\text{Variation}} = \underbrace{\frac{1}{2}(G_1 + G_2)}_G + \underbrace{\frac{1}{2}(R_1 + R_2)}_R, \quad (11)$$

which is the one we shall use in the subsequent empirical analysis.

3 Data and summary statistics

The data used in the paper are obtained from national household surveys from as many countries as possible through PovcalNet.⁷ PovcalNet is the global database of national household surveys compiled by the research department of the World Bank, and it is the source of the World Bank's global poverty estimates.

In our analysis, we use 48 comparable household surveys for 24 Sub-Saharan African countries, the same Beegle et al. used (2016).⁸ For each country, we consider two survey years distant enough in time to allow for meaningful comparisons of consumption distributions. This distance varies between 5 and 14 years, because the household surveys are not released every year in every country but take place in different periods for each country. Overall, the period observed covers two decades, since the late 1990s to the early years of this decade.

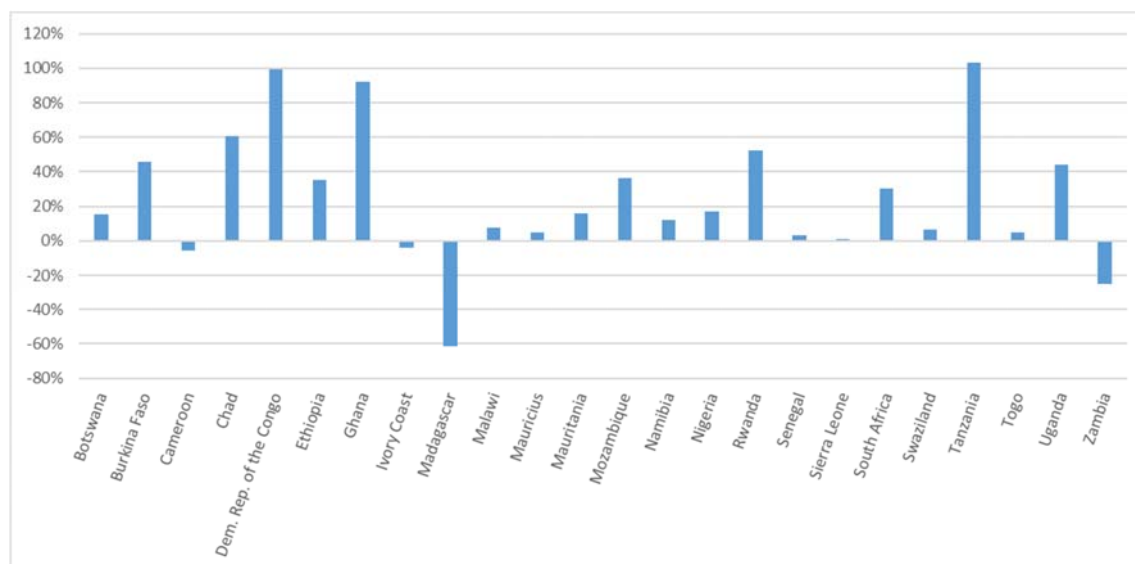
⁷ GLOBAL TSD/GPWG ([year of access (2017. As of [date of access (12/10/2017)] via Datalibweb Stata Package.

⁸ Namely, the countries analyzed are: Botswana, Burkina Faso, Cameroon, Chad, Democratic Republic of Congo, Côte d'Ivoire, Ethiopia, Ghana, Madagascar, Malawi, Mauritius, Mauritania, Mozambique, Namibia, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Swaziland, Tanzania, Togo, Uganda, Zambia.

We use (per capita) household expenditure as the main welfare indicator throughout the analysis.^{9,10} In that, we depart from the literature using income as a measure of well-being. In economies where agriculture is an important and established sector, consumption has indeed proven preferable to income because the latter is more volatile and more highly affected by the harvest seasons, so that relying on income as an indicator of welfare might under- or over-estimate living standards significantly (see, for instance, Deaton and Zaidi, 2002). On the theoretical ground, as consumption gives utility to individuals, the analysis of its distribution should be the most natural approach to study well-being. Income matters insofar as it gives access to consumption, which is the ultimate source of individual welfare. Consumption is a better measure of long-term welfare also because households can borrow, draw down on savings, or receive public and private transfers to smooth short-run fluctuations.

As the data show, for many of the countries studied average household consumption increased over time, following the significant economic growth Sub-Saharan Africa experienced over the last decades (e.g. Beegle et al., 2016). We can see this trend in Figure 2.

Figure 2: Household consumption mean growth rates for each country.

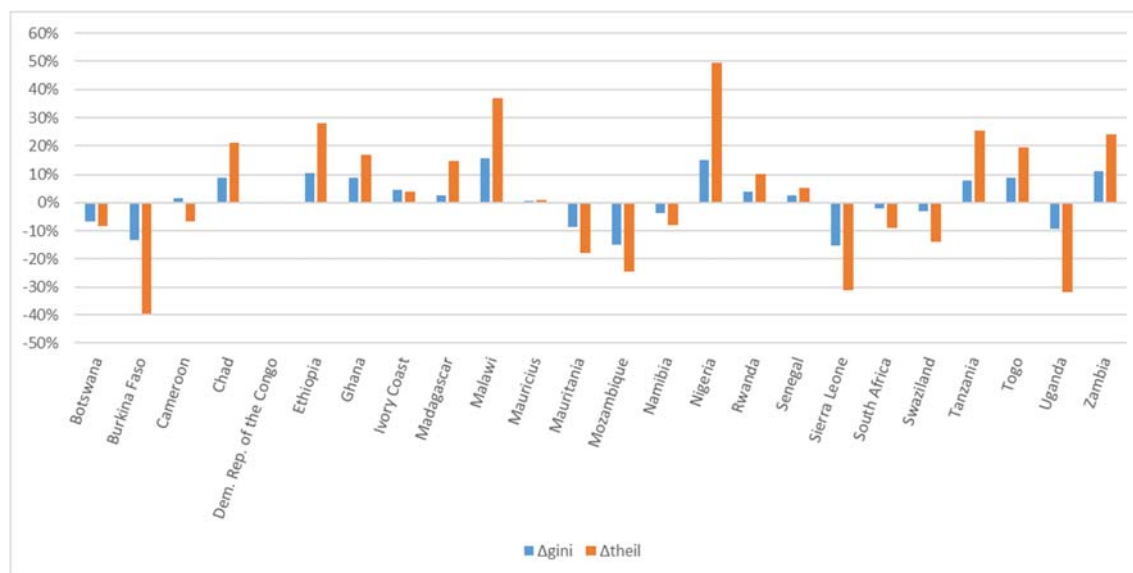


⁹ To enhance comparability among the very different surveys, all consumption values are expressed in 2011 international dollars (PPP).

¹⁰ For Ghana, we use the national poverty line in local currency. For Nigeria, we estimate the consumption distribution for 2003/04 using a “survey-to-survey” imputation method. For more details, see Clementi et al. (2015).

Standard measures of inequality seem not to capture this widening gap between rich and poor. As shown in Figure 3, both the Gini and Theil indices declined for most of the analyzed countries, even though they start from a very high level.

Figure 3: Gini index and Theil index variations for each country.



As for polarization, calculation of the Foster-Wolfson (FW) and Duclos-Esteban-Ray (DER) indices produced evidence that is mixed and thus hard to interpret.¹¹

4 Empirical results

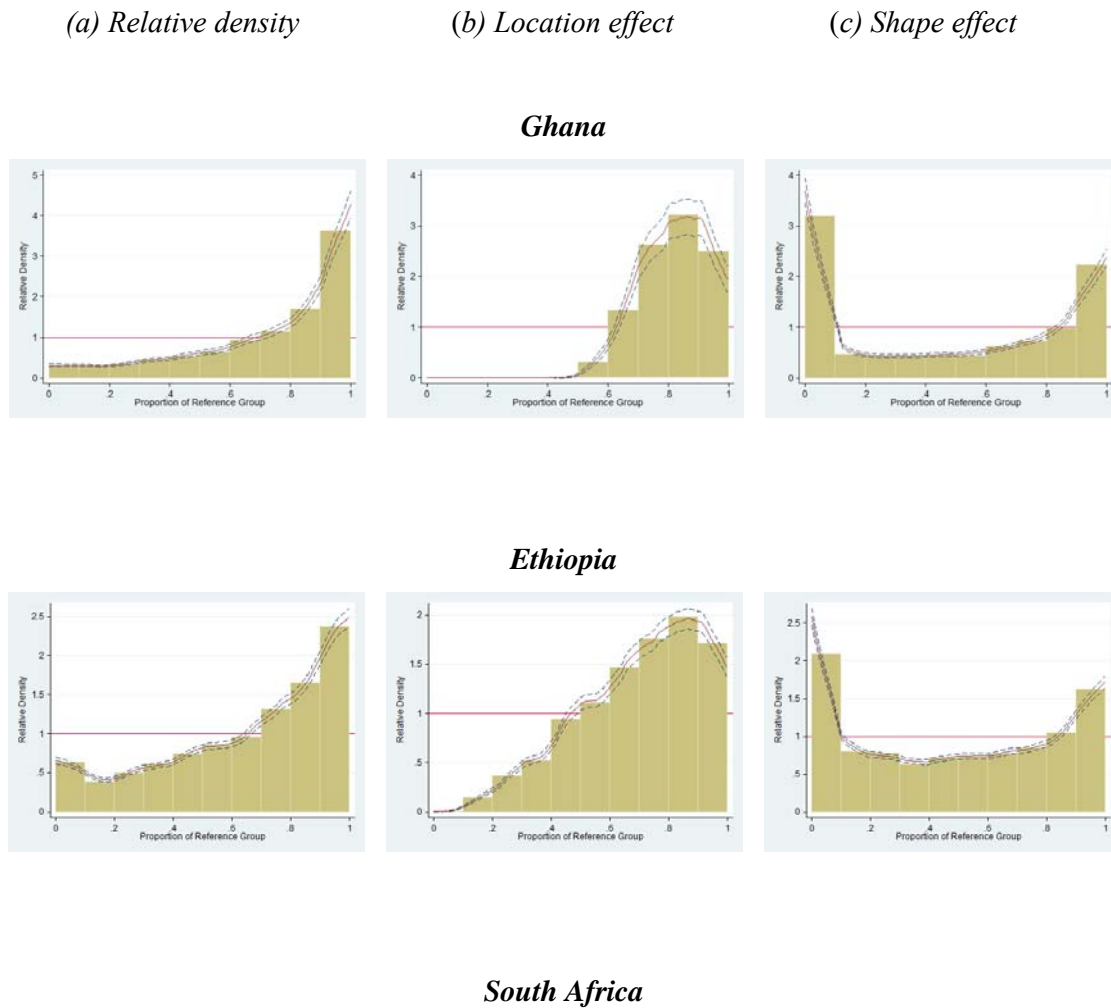
In this section, we first provide an overview of the results of the standard relative distribution decomposition into growth effect and shape effect showing that in most analyzed countries, the consumption distribution polarized, in particular, in the lower tail of the distribution; in other words, these countries faced a significant process of lower polarization. In the second part, by decomposing the poverty variation into growth and shape effects, we show how this lower polarization offset the potential gains stemming from growth in consumption.

¹¹ The inequality indices (Gini and Theil) and the polarization indices (Foster-Wolfson and Duclos-Esteban-Ray) have been estimated using the Distributive Analysis Stata Package, which is freely available at <http://dasp.ucn.ulaval.ca/>.

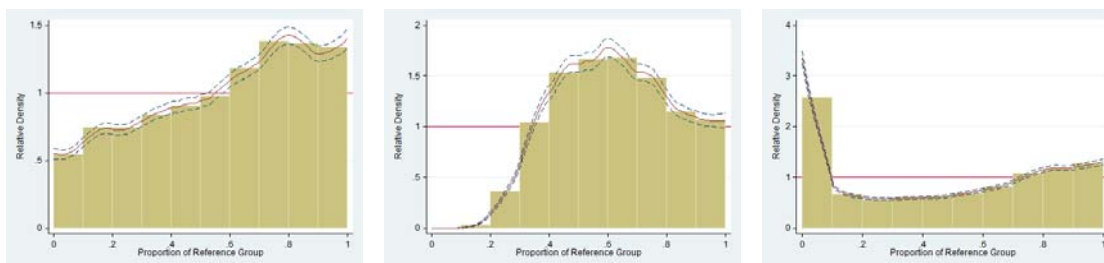
4.1 Changes in Sub-Saharan Africa’s consumption distributions

Figure 4 presents the overall distribution and the decomposition into location and shape for three countries, one for each macro-region: Ghana for West Africa, Ethiopia for East Africa and South Africa for the Southern cone.¹² The left panel for each country depicts the overall relative distribution, showing the fraction of households in the comparison year’s distribution that fall into each decile of the reference year’s distribution. The location effect, i.e. the effect only due to the median shift, is shown in the middle panels of Figure 4. Finally, the right panels of Figure 4 display the shape effect, which represents the relative distribution net of the median influence.

Figure 4: Relative distribution plots.



¹² The analysis has been performed using the R package `reldist` (Handcock, 2016). The results for the remaining 34 countries are available upon request.



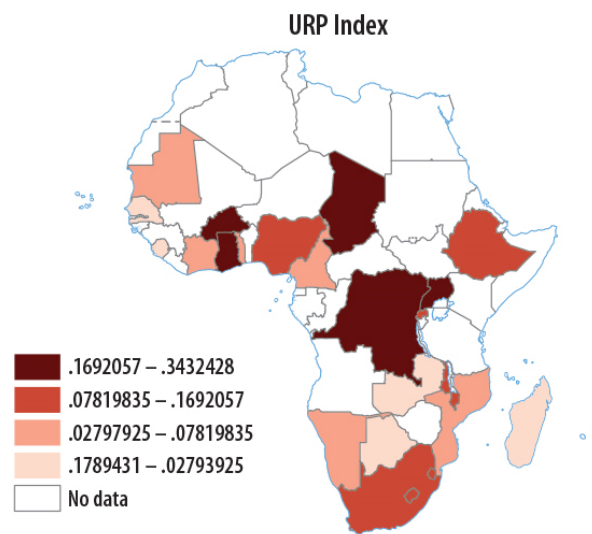
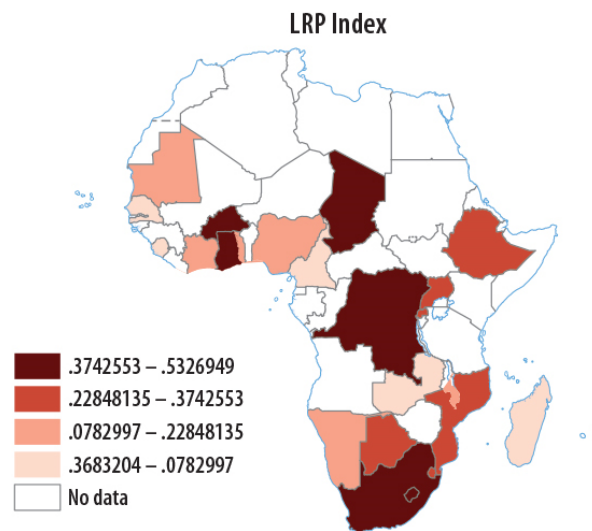
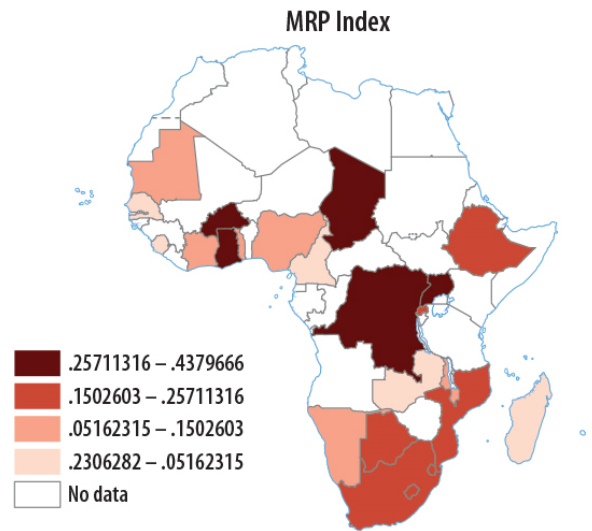
Looking at the shape effect graphs, we observe a clear concentration in the lowest decile. Values above 1 indicate that, in relative terms, there are more households in that decile of the distribution at the end of the period than there were at the beginning, vice versa less than 1 means there are less, and equal to 1 means that things have not changed: 10 percent of households were in that decile at the beginning and 10 percent remained there. Therefore, relative to the initial period, households in the lowest percentiles of each country increased by 14 percentage points (+1.4 over 1) in Ethiopia, 20 (+2 over 1) in Ghana and 15 in South Africa (+1.5 over 1). In the three countries, this concentration in the lower tails (downgrading) is paralleled by a similar but smaller concentration in the upper tails (upgrading). Overall, the two effects produce a U-shaped relative density; households are concentrated in the tails of the distribution while the middle of the distribution hollows out.

For the sake of space, we analyze the performance of the remaining countries using the relative polarization indexes; these keep track of changes in the shape of the distribution and measure their direction and magnitude. Figure 5 plots the median, lower and upper polarization indexes for each country on a map. The null hypothesis of no change with respect to the reference distribution is tested for each index and in 21 of the 24 countries, the variation in the indexes is significant.¹³

The type of distributional change observed for Ghana, Ethiopia and South Africa is closely replicated by 16 other countries; all of them experience a significant increase in polarization that is predominantly driven by a downgrading of the consumption distribution, the only notable exception being Nigeria where upgrading and downgrading are almost equivalent (see Clementi et al., 2017). Interestingly, the polarization phenomenon appears widespread in the region, while only in Madagascar and Zambia it decreased significantly.

¹³ Results are available upon request.

Figure 5: Relative polarization indices.



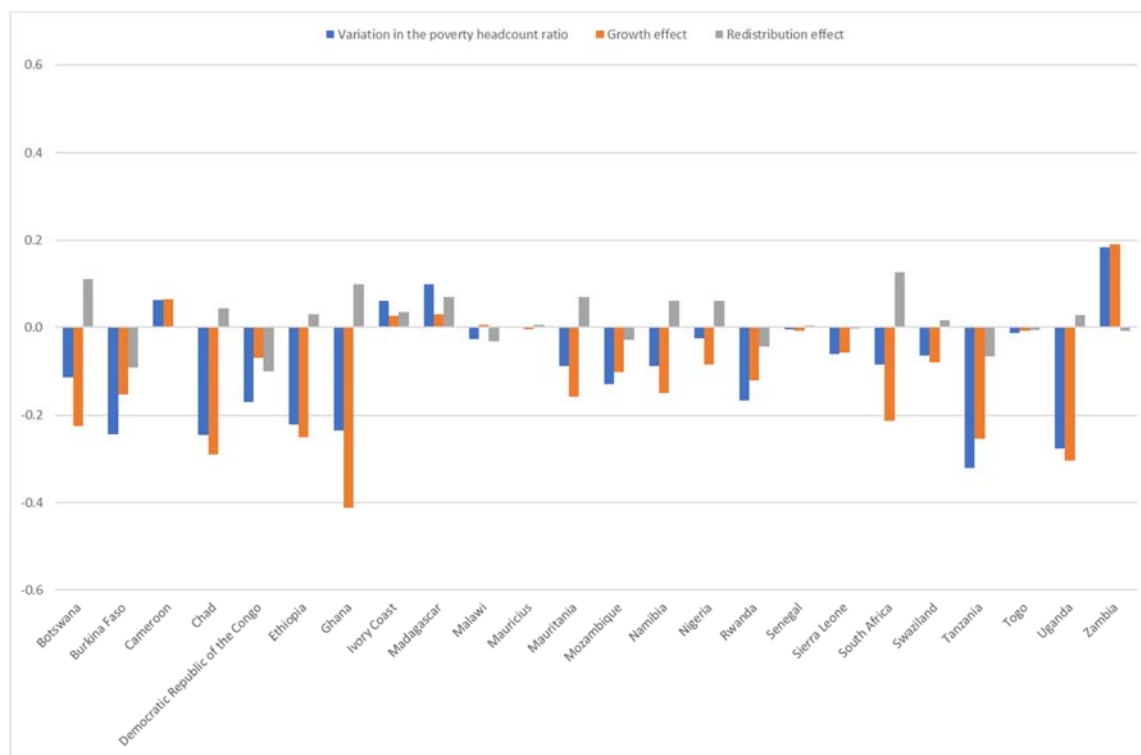
Another common feature of the group of polarizing countries is that the Gini index either increased little or, as mentioned before, decreased. It is interesting to note that in the same period, economies more advanced than the SSA African ones, but equally reliant on commodities such as the Russian Federation and Brazil, experienced similar distributional changes. Nissanov and Pittau (2015) find that during the commodity boom of the 2000s, household net income restarted to grow after a long decline, Gini decreased while polarization increased, driven mainly by a downgrading in the income distribution. Likewise, Clementi and Schettino (2015) find that the decline in Gini experienced in Brazil between 2000-12 is accompanied by a hollowing out of the middle of the distribution and accentuated concentration of households in the lower tail.

4.2 Decomposition results

Once ascertained that there was a significant pro-polarization distributional change in the clear majority of SSA countries analyzed, we now proceed by linking this change to poverty reduction or lack thereof.

Figure 6 displays the results of the poverty “growth and polarization” decomposition (11) that explicitly links the downgrading of the distribution to the reduced impact of growth on poverty. Results are self-explanatory: in 13 of the 19 countries where the lower polarization took place, it offset the poverty reduction benefits that could have arisen from growth. The magnitude differs from a minimum registered by Senegal to a maximum registered by South Africa; on average, this effect contributed to a 5-6 percentage points lessening in poverty reduction.

Figure 6: Variation in the poverty headcount ratio and decomposition into growth and redistribution components (our method).



The question then arises as to why standard measures/decompositions did not capture this effect. Figures 7(a) and 7(b) compare our approach and the growth and distributive effects of a widely-used decomposition, that of Datt and Ravallion (1992). As it appears, the negative distributive effect (against poverty reduction) of this latter is always minimal or in many cases the distributional change is pro-poor. Our point is that the distributional change SSA countries went through could only be detected by the method we propose, and not by decompositions based on standard summary tools to measure distributional changes.

Figure 7.a: Comparison of growth component between our methods and the Datt and Ravallion's one.

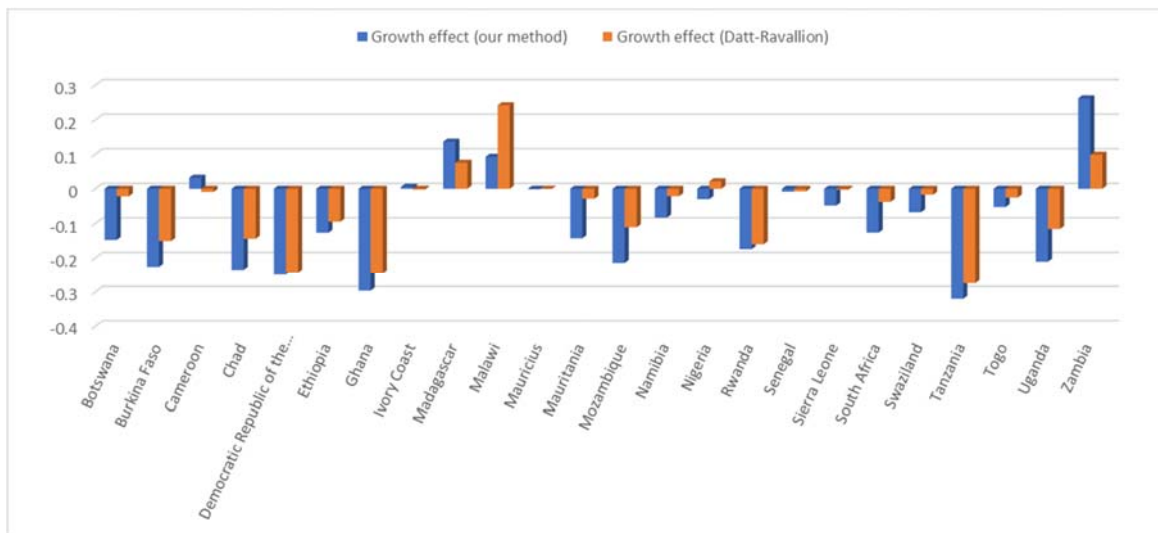
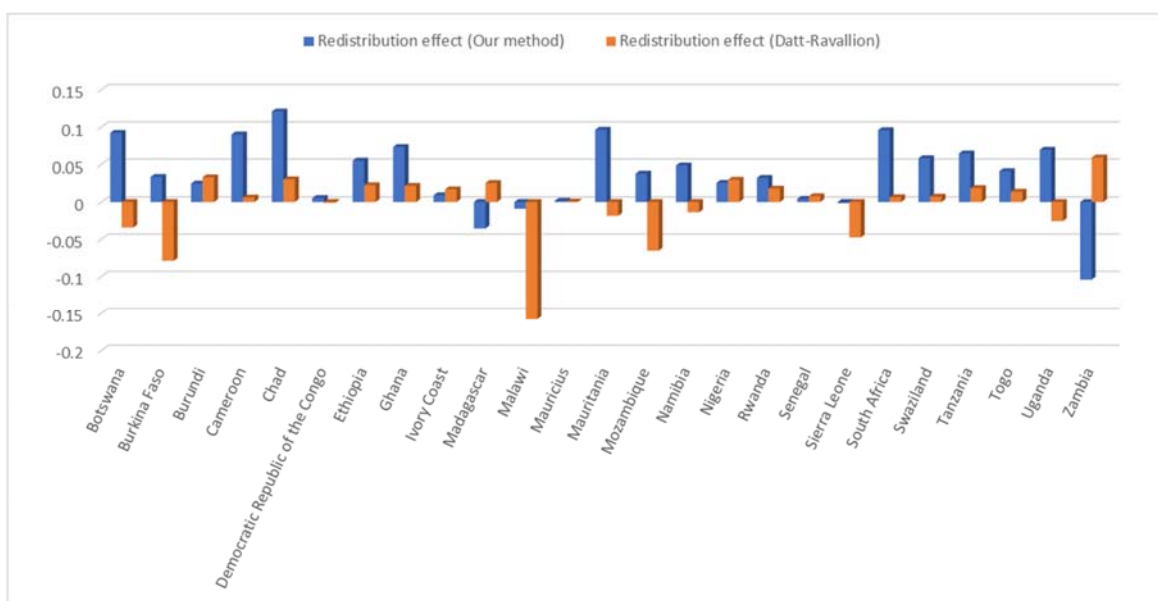


Figure 7.b: Comparison of redistribution component between our method and the Datt and Ravallion's one.



The reason is simple. Summary measure like Gini analyze the dispersion around the mean of the distribution and this, as shown in Figure 7, either did not change or sometimes improved in Africa. Also, most importantly, summary measures do not assign a weight to the different percentiles; therefore, if a pro-inequality change in one part of the distribution is more than compensated by a pro-equality change in the rest of the distribution, these measures will decline. Yet, the distributional changes that matter most for poverty reduction are those localized in the lower part of the distribution but can be detected only if one can look at changes

at a very granular level. The type of decomposition we propose can shed light on this, whereas standard decompositions based on summary measures like Gini likely cannot.

The results of our analysis echo some recent findings from a recent World Bank (2018) report on structural transformation in Africa. While our analysis focuses on distributional changes, the report looks at changes in the labor markets and productivity that might explain the low growth-to-poverty elasticity in Africa. The low contribution of employment growth to poverty reduction, slow gains in agricultural productivity and a transition outside agriculture towards sectors characterized by equally low productivity all contributed to characterize SSA growth as little inclusive and consequently less able than other regions in the world in reducing poverty. From a distributional point of view, our paper complements this analysis by showing that this missed opportunity also translated into an increasing divide between the bottom 30-40 percent of the consumption distribution and the rest.

5 Summary conclusions

Since the end of the 1990s, two leading narratives prevailed when analyzing Sub-Saharan Africa. The first, predominant, painted a picture of a continent on track in reducing poverty, where middle classes were expanding, and prosperity was reaching large swaths of the population (African Development Bank, 2011; The Economist, 2011, 2013; McKinsey, 2012). The other narrative acknowledged the relatively robust growth, with a slow reduction in poverty, without however conclusive evidence on the mechanisms that hindered growth from trickling down.

This paper, to our knowledge, is the first attempt to provide a comprehensive explanation, from a distributive point of view, of this low growth elasticity to poverty that characterized SSA in a time when other regions in the world, growing as much as Africa, fared much better in terms of poverty reduction.

To show that important distributional changes took place in SSA and that these played against inclusive growth, this paper develops a novel yet simple decomposition based on the “relative distribution” method (Handcock and Morris, 1998, 1999). Whereas the standard “relative distribution” method enables to summarize multiple features of the welfare distribution, our small innovation links these changes to the poverty reduction process producing a poverty growth polarization decomposition.

In a nutshell, we find that the vast majority of SSA countries we analyze (about 80 percent) between the late 1990s and early 2010s experienced a very similar distributional change of lower polarization—that is the clustering of the poorest 30-40 percent around a local mean and an increasing divide between this group and the rest of the distribution. We also observe an upgrading in the distribution that is the fattening of the upper tail of the distribution (upper polarization), but only in the case of Nigeria this is commensurate to the lower polarization.

This low polarization process has important implications for poverty reduction. The proposed decomposition shows that polarization substantially reduces the positive effect of growth on poverty reduction: on average without downgrading, poverty could have been 5-6 percentage points lower in SSA. Standard decompositions of poverty into growth and inequality components fail to capture the impact of this distributional change on poverty also because there is hardly a common Gini pattern in SSA, whereas we show there is a clear downgrading pattern.

The potential policy implications are numerous. First, we show that the type of growth SSA experienced in the last decade was a sort of double-edged sword. It certainly reduced poverty but at the same time it increased the divide between the bottom 40 percent (World Bank, 2012) and the rest of the population. Therefore, since SSA's growth is not inclusive *per se*, more efforts should be put to expand the benefits of growth by diversifying economies into labor intensive sectors and reducing the divide between advanced and underdeveloped regions within each country. Second, it looks like this divide is a slow-motion process that accumulated over many years; evidence from Ghana and Nigeria for example (Bertoni et al., 2016; Clementi et al., 2017, 2018) indicates that human capital, demography and basic infrastructures are the main drivers of the polarization process. Reversing this trend will require time and resources in a macroeconomic context that has substantially worsened after 2014; many SSA countries yet again experienced sluggish growth, high inflation rates and falling fiscal revenues.

References

- African Development Bank. *Annual Report*. Statistics Department of the African Development Bank Group, 2011. Available at <http://www.afdb.org/knowledge/publications/annual-report/annual-report-2011/>.
- A. S. Alderson and K. Doran. Global Inequality, Within-Nation Inequality, and the Changing Distribution of Income in Seven Transitional and Middle-Income Societies. In C. Suter,

- editor, *Inequality beyond Globalization: Economic Changes, Social Transformations, and the Dynamics of Inequality*, pages 183-200. Transaction Publishers, New Brunswick, NJ, 2011.
- A. S. Alderson and K. Doran. How Has Income Inequality Grown? The Reshaping of the Income Distribution in LIS Countries. In J. C. Gornick and M. Jäntti, editors, *Income Inequality: Economic Disparities and the Middle Class in Affluent Countries*, pages 51-74. Stanford University Press, Stanford, CA, 2013.
- A. S. Alderson, J. Beckfield, and F. Nielsen. Exactly How Has Income Inequality Changed? Patterns of Distributional Change in Core Societies. *International Journal of Comparative Sociology*, 46:405-423, 2005.
- A. B. Atkinson and A. Brandolini. On Analyzing the World Distribution of Income. *World Bank Economic Review*, 24:1-37, 2010.
- K. Beegle, L. Christiaensen, A. L. Dabalen, and I. Gaddis. Poverty in a Rising Africa. World Bank, Washington, DC, 2016. Available at <https://openknowledge.worldbank.org/handle/10986/22575>.
- E. Bertoni, F. Clementi, V. Molini, F. Schettino, and H. Teraoka. *Poverty Work Program: Poverty Reduction in Nigeria in the Last Decade*. Technical Report, The World Bank, Washington DC, 2016. Available at <http://documents.worldbank.org/curated/en/103491483646246005/Poverty-work-program-poverty-reduction-in-Nigeria-in-the-last-decade>.
- F. Borraz, N. González, and M. Rossi. Polarization and the Middle Class in Uruguay. *Latin American Journal of Economics*, 50:289-326, 2013.
- F. Clementi, A. L. Dabalen, V. Molini, and F. Schettino. When the Centre Cannot Hold: Patterns of Polarization in Nigeria. *Review of Income and Wealth*, 63:608-632, 2017.
- F. Clementi, V. Molini, and F. Schettino. All that Glitters is Not Gold: Polarization amid Poverty Reduction in Ghana. *World Development*, 102:275-291, 2018.
- F. Clementi and F. Schettino. Income Polarization in Brazil, 2001-2011: A Distributional Analysis Using PNAD data. *Economics Bulletin*, 33:1796-1815, 2013.
- F. Clementi and F. Schettino. Declining Inequality In Brazil in the 2000s: What Is Hidden Behind? *Journal of International Development*, 27:929-952, 2015.

- G. Datt and M. Ravallion. Growth and Redistribution Components of Changes in Poverty Measures: A Decomposition with Applications to Brazil and India in the 1980. *Journal of Development Economics*, 38:275-295, 2012.
- C. D'Ambrosio. Household Characteristics and the Distribution of Income in Italy: An Application of Social Distance Measures. *Review of Income and Wealth*, 47:43-64, 2001.
- A. Deaton and S. Zaidi. *Guidelines for Constructing Consumption Aggregates for Welfare Analysis*. LSMS Working Paper 135, World Bank, Washington, DC, 2002. Available at available at <https://openknowledge.worldbank.org/handle/10986/14101>.
- J.-Y. Duclos, J.-M. Esteban, and D. Ray. Polarization: Concepts, Measurement, Estimation. *Econometrica*, 72:1737-1772, 2004.
- J.-M. Esteban and D. Ray. On the Measurement of Polarization. *Econometrica*, 62:819-851, 1994.
- J.-M. Esteban and D. Ray. Conflict and Distribution. *Journal of Economic Theory*, 87:379-415, 1999.
- J.-M. Esteban and D. Ray. Polarization, Fractionalization and Conflict. *Journal of Peace Research*, 45:163-182, 2008.
- J.-M. Esteban and D. Ray. Linking Conflict to Inequality and Polarization. *The American Economic Review*, 101:1345-1374, 2011.
- J.-M. Esteban, C. Gradín, and D. Ray. An Extension of a Measure of Polarization, with an Application to the Income Distribution of Five OECD Countries. *Journal of Economic Inequality*, 5:1-19, 2007.
- J. E. Foster and M. C. Wolfson. *Polarization and the Decline of the Middle Class: Canada and the US*. OPHI Working Paper 31, University of Oxford, Oxford, 1992. Available at <http://www.ophi.org.uk/working-paper-number-31/>, now in *Journal of Economic Inequality*, 8:247-273, 2010.
- C. Gagliarano and K. Mosler. Constructing Indices of Multivariate Polarization. *Journal of Economic Inequality*, 7:435-460, 2009.
- C. Gradín. Polarization by Sub-Populations in Spain, 1973-91. *Review of Income and Wealth*, 46:457-474, 2000.

- M. S. Handcock. *Relative Distribution Methods*. Version 1.6-6, 2016. Project home page at <http://www.stat.ucla.edu/~handcock/RelDist>. Available at <https://CRAN.R-project.org/package=reldist>.
- M. S. Handcock and M. Morris. Relative Distribution Methods. *Sociological Methodology*, 28:53-97, 1998.
- M. S. Handcock and M. Morris. *Relative Distribution Methods in the Social Sciences*. Springer-Verlag Inc., New York, NY, 1999.
- A. Heshmati. A Review of Decomposition of Income Inequality. In A. Heshmati, editor, *Global Trends in Income Inequality*, pages 27-48. Nova Science Publishers, Hauppauge, NY, 2007.
- L. R. Jain and S. D. Tendulkar. Role of Growth and Distribution in the Observed Change of Headcount Ratio Measure of Poverty: A Decomposition Exercise for India. *Indian Economic Review*, 25:165-205, 1990.
- N. Kakwani. On Measuring Growth and Inequality Components of Poverty with Application to Thailand. *Journal of Quantitative Economics*, 16:67-78, 2000.
- N. Kakwani and K. Subbarao. Rural Poverty and Its Alleviation in India. *Economic and Political Weekly*, 25:A2-A16, 1990.
- M. C. Lasso de la Vega and A. M. Urrutia. An Alternative Formulation of Esteban-Gradin-Ray Extended Measure of Polarization. *Journal of Income Distribution*, 15:42-54, 2006.
- F. Levy and R. J. Murnane. U.S. Earnings Levels and Earnings Inequality: A Review of Recent Trends and Proposed Explanations. *Journal of Economic Literature*, 30:1333-1381, 1992.
- R. Massari. *Is Income Becoming More Polarized in Italy? A Closer Look with a Distributional Approach*. DSE Working Paper 1, Sapienza University of Rome, Rome, 2009. Available at <http://phdschool-economics.dse.uniroma1.it/website/WorkingPapers/MassariWP1.pdf>.
- R. Massari, M. G. Pittau, and R. Zelli. A Dwindling Middle Class? Italian Evidence in the 2000s. *Journal of Economic Inequality*, 7:333-350, 2009a.
- R. Massari, M. G. Pittau, and R. Zelli. Caos calmo: l'evoluzione dei redditi familiari in Italia. In L. Cappellari, P. Naticchioni, and S. Staffolani, editors, *L'Italia delle disuguaglianze*, pages 19-28. Carocci editore, Rome, 2009b.

- B. Milanovic. *A New Polarization Measure and Some Applications*. Mimeo, 2000. Available at <http://siteresources.worldbank.org/INTDECINEQ/Resources/polariz.pdf>.
- V. Molini and P. Paci. *Poverty Reduction in Ghana: Progress and Challenges*. World Bank, Washington, DC, 2015. Available at <https://openknowledge.worldbank.org/handle/10986/22732>.
- Z. Nissanov. *Economic Growth and the Middle Class in an Economy in Transition: The Case of Russia*. Springer-Verlag, New York, NY, 2017.
- Z. Nissanov and M. G. Pittau. Measuring Changes in the Russian Middle Class between 1992 and 2008: A Nonparametric Distributional Analysis. *Empirical Economics*, 50:503–530, 2016.
- I. Petrarca and R. Ricciuti. Relative Income Distribution in Six European Countries. In J. A. Bishop and J. G. Rodríguez, editors, *Inequality after the 20th Century: Papers from the Sixth ECINEQ Meeting (Research on Economic Inequality, Volume 24)*, pages 361–86. Emerald Group Publishing Limited, Bingley, UK, 2016.
- A. Poggi and J. Silber. On Polarization and Mobility: A Look at Polarization in the Wage-Career Profile in Italy. *Review of Income and Wealth*, 56:123-140, 2010.
- M. Reynal-Querol. Ethnicity, Political Systems and Civil War. *Journal of Conflict Resolution*, 46:29-54, 2002.
- M. C. Wolfson. When Inequalities Diverge. *The American Economic Review*, 84:353-358, 1994.
- M. C. Wolfson. Divergent Inequalities: Theory and Empirical Results. *Review of Income and Wealth*, 43:401-421, 1997.
- X. Zhang and R. Kanbur. What Difference Do Polarisation Measures Make? An Application to China. *Journal of Development Studies*, 37:85-98, 2001.
- World Bank. *Has Economic Transformation Worked for the African Poor?* Forthcoming, 2018.