Growth, inequality and poverty reduction in sub-Saharan Africa

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Résumé
Cette étude tente de comprendre l'impact de la croissance économique sur la pauvreté en Afrique subsaharienne au cours des dernières décennies, notamment en étudiant le rôle des inégalités dans cette relation. Les résultats de l'analyse, utilisant une méthode statique et autre méthode dynamique (GMM), prouvent l'hypothèse de croissance «pro-pauvres». Ce dernier réduit considérablement la pauvreté. Quant à l'inégalité, il joue un rôle important dans la relation croissance et pauvreté. Il freine l'impact de la croissance sur la réduction de la pauvreté.

Mots-clés : croissance économique, inégalités, pauvreté, Afrique subsaharienne

Abstract
This study attempts to understand the impact of economic growth on poverty in sub-Saharan Africa over the past decade, including studying the role of inequality in this relationship. The results, using both static and dynamic methods (GMM), prove the “pro-poor” growth hypothesis. The latter significantly reduces poverty. We can see the crucial role of inequality in the relationship between growth and poverty. It curbs the impact of economic growth on poverty reduction.

Keywords: economic growth, inequality, poverty, sub-Saharan Africa

INTRODUCTION
During the period 2000-2017, the economic growth in sub-Saharan Africa (SSA) was interesting. This growth was high and robust, with a rate of 5% above the global average (AfDB,
OECD and UNDP 2017). In contrast, this region is unable to reach the Millennium Development Goals (MDGs) and still suffers from poverty. The region has the highest under-five mortality rate (UNICEF, 2015) and the highest maternal mortality rates (WHO, 2015). For example, it brings together a large number of the population, who does not have sustainable access to a supply of drinking water or basic sanitation services, etc. Overall, inequality is decreasing, but remains at worrying levels.

As well, this region is the second most unequal region (after Latin America and the Caribbean). For the period from 2000 to 2009 the Gini coefficient is 43.9 (MDG, 2014).

In short, the situation of SSA raises an important paradox: although the growth achieved in this region is impressive, the MDG program has failed and poverty still persists. Hence an important question at this level: Why this duality?

The purpose of this study is to analyze the effectiveness of economic growth in poverty decrease, it is a question of determining the crucial role of inequalities in this relationship.

To achieve our goal, the rest of the document is organized as following. A literature review will be continuing in the second section. While the third section will be devoted to the methodology used in the study and the results obtained. The study ends with a conclusion and implications of economic policies.

1. LITERATURE REVIEW

The growth-poverty relationship has been the subject of several theoretical and empirical studies. There are studies that defend the idea that economic growth can't reduce poverty. Others support the idea that growth is an important factor in poverty reduction, the extent of which varies from study to study. Dollar and Kraay (2002) ‘s research, one of the studies that support this argument. Theirs results show that economic growth is beneficial to the poor by increasing their incomes. Kraay (2006) reported that the variation in poverty is mainly associated with income growth. Its results highlight the importance of growth in poverty reduction and suggest that poverty reduction policies should focus on the determinants of growth. A well as, results are obtained by Daouda (2013), based on a study done on Nigeria over fairly variable periods. The results obtained suggest that in order to reduce poverty, the country must have strong and sustained growth.

Other recent studies, such as that of Pinkovskiy and Sala-i-Martin (2014), have shown that the impressive growth achieved in SSA has contributed positively to the poverty reduction. Thus,
Kodila-Tedika and al. (2016), Shimeles and Ncube (2015) have proved that growth leads to the widening of the middle class in Africa.

The extent of the impact of growth on poverty is still debatable. During the 1990s, the elasticity of poverty to growth was found between -2 and -3 for developing countries (Adams, 2003; Ravallion&Chen, 1997), Bhalla (2002) also estimated this value to be -5. However, Fosu (2010) found this value between -0.02 and -0.68 using data from the 1980s for a sample of African economies. Also, Fanta and Upadhyay (2009) reported that this coefficient was about -0.5 for 16 African countries, while the values for South Asia was estimated to be between -0.20 and -0.22 (Ram, 2011). As a result, the elasticity of poverty to economic growth may vary by region and time.

In addition, two studies using the same data as Dollar and Kraay (2002) supported the idea that growth did not contribute to poverty reduction. Eastwood and Lipton (2001) argued that there are many exceptions where economic growth has not helped the poor, it's based on the study of Donaldson (2008) which identified positive and other negative exceptions. He concluded that the negative exceptions, the incomes of the poor can't be increased with a rapid economic growth. While the positive exception, the incomes of the poor increased with a negative growth. Other research conducted in only one country also revealed that there have been cases where growth has not led to a reduction in poverty (Basu&Mallick, 2008; Balisacanandal, 2003).

Concerning the role of inequality in poverty reduction, it is clearly defined in several studies: those based on temporal data and others on panel data. Indeed, Cheema and Sial (2012) show that a small change in the income distribution can have a significant effect on the poverty rate (Pakistan). Similar positive and significant effects were observed by Ravallion and Chen (1997), Ali and Tahir (1999), Ram (2007) and Lombardo (2008).

Kakwani (2001) and Son (2007) showed that the elasticity of inequality should be positive as a reduction in inequality should reduce poverty.

Based on survey data between 1980 and 1998, Naschold (2005) showed that for a given level of growth, rising inequality leads to higher levels of poverty. Using African data, Anyanwu and Erhijakpor (2010) found a coefficient associated with the Gini index, positive and significant, which implies that greater inequality leads to higher poverty. Ali and Thorbecke (2000) found that poverty is more sensitive to inequality than to changes in income. This idea is supported
by Fosu (2010). He proved throughout a study for 80 African countries that the impact of inequality on poverty is greater than that of economic growth.

In addition, many studies highlight the important role of inequality in determining the responsiveness of poverty to economic growth. As Ravallion, Chen (1997) and Kakwani (2004) argues, the poverty will be more insensitive to growth when the initial inequality is high. Easterly (2000) and Adams (2004) were particularly interested in the role of inequality in the effectiveness of specific policies. To assess the effectiveness of the Bretton Woods program, Easterly (2000) introduced an interaction variable between growth and the level of inequality in the poverty-growth, he observed that the program’s impact is reinforced by lower levels of inequality. While Adams (2004) showed that the elasticity of poverty-growth (expressed in absolute terms) is higher in countries with lower levels of inequality.

Fosu (2008, 2009, 2010a, 2010b, 2015, 2016) has developed several studies, to appreciate the crucial role played by inequality. The results of the various studies provide additional support for the importance of inequality in the effectiveness of growth in poverty reduction, so he concluded that a low-level of inequality is associated with a low-level of poverty. This is not a general. In very low income countries reducing inequality could actually increase poverty. Mostly people are likely to be below the poverty line as a result of this policy.

Using annual data on Pakistan Cheema and Sial (2012) showed that inequality has played an important role in the fight against poverty. Similar positive and significant effects were observed by Ali and Tahir (1999), Saboor (2004), Adams (2004) and Ram (2007) for a group of countries, Wodon (1999) for Bangladesh, Lombardo (2008) for Italy, Anyanwu and Erhijakpor (2010) for a sample of African countries.

Small changes in the income distribution can have a significant effect on the national income poverty rate (White and Anderson, 2001). Kakwani (2001) and Son (2007) showed that the elasticity of inequality should always be positive as a decrease in inequality should reduce poverty. As Fosu (2015) argues, high initial inequality is important because at a high-level of inequality, poverty will be more insensitive to growth. This work has concluded that economic growth reduces poverty more low inequality countries than in those with high inequality.

The above discussion suggests that differences in country experiences in poverty reduction may be attributable in considerable part to disparities in economic growth. Indeed, according to a
strand of the literature, growth is the most powerful. If not the only agent for poverty-reduction (Dollar and Kraay, 2002). Nonetheless, as we have also observed, there are many countries where growth may not adequately be translated to poverty reduction.

As alluded to in the literature review, however, an increasing number of studies have shown that inequality may play a crucial role in the transformation of growth to poverty reduction (Adams, 2004; Bourguignon, 2003; Easterly, 2000; Epaulard, 2003; Fosu, 2009; Kalwij and Verschoor, 2007). In general, less initial inequality would imply a greater (absolute) value of the income elasticity, so that a larger amount of poverty decline would accompany a unit of growth.

2. ECONOMETRIC ANALYSIS

In this case, we can explore the global evidence on the transformation of growth, as well as changes in inequality, to poverty reduction. Inequality serving as an important inter mediation factor. Different types of models have been used to capture this relationship, so one type involves separate estimation of the poverty equation for different Gini coefficients (Adams, 2004).

In order to determine the nature of SSA growth and to assess the effect of inequality in the growth-poverty relationship, we take into account the model, the data source, the study period and method estimation.

2.1 SPECIFICATION OF THE MODEL

Ce lien est de nature positive ou négative selon les études (Lepage, 1998).

Our study includes a sample of 18 SSA countries (Benin, Burkina Faso, Burundi, Cameroon, Congo republic, Ethiopia, Guinea, Lesotho, Malawi, Mozambique, Namibia, Nigeria, Rwanda, Senegal, Tanzania, Togo, Uganda, Zambia) over the period 2001-2020. We opt for the relatively fully specified poverty equation, whose derivation is guided by the assumption that income is log-normally distributed (Bourguignon, 2003). The model is presented by the following expression:

To empirically verify the relationship between growth and poverty, we will rely on the model of Bourguignon (2003):

\[
\frac{DP}{Pi, t} = a_i + b_1 \frac{DY}{Y_i, t} + b_2 \frac{DG}{Gi, t} + \epsilon_i, t \quad (1)
\]
The main objective of this part is to study whether inequalities affect the effectiveness of growth in poverty reduction. We take into account the interactive term between growth and inequality. This specification is a model that includes an interaction of growth with initial inequality (Fosu, 2009). Thus, the model (1) is modified as follows:

\[
\frac{DP}{Pi, t} = a_i + b_1 \frac{DY}{Y_i, t} + b_2 \frac{DG}{G_i, t} + b_3 \frac{DY}{G_i, t} \times \frac{GI}{Y_i, t} + b_4 \frac{DG}{G_i, t} \times \epsilon_i, t \quad (2)
\]

Or:

\[
DP / P \quad \text{the poverty growth rate is the dependent variable. The independent variables are the growth rate of GDP (DY / Y), the growth rate of inequality (DG / G), the interaction between economic growth and inequality (DY / Y * GI) used to control the effect of growth on poverty, and the interaction of the inequality and its initial level (DG / G * GI). With the individual specific effect, b1, b2, b3 and b4, are the parameters to be estimated in this model and } \epsilon_i, t \text{ is the error term.}
\]

Poverty is no longer monetary, but it is expressed in a multidimensional view using the main component analysis method taking into account 10 factors. The measure of inequality is the Gini coefficient. It ranges from 0 to 100. The higher level correspond to the greatest degree of inequality.

The sign of b1 is anticipated to be negative, so that an increase in growth should reduce poverty growth. In contrast, b3 is expected to be positive, for a higher level of initial inequality would decrease the rate at which growth acceleration is transformed to poverty reduction (Bourguignon, 2003, Epaulard, 2003, Fosu, 2009, Kalwij and Verschoor, 2007).

The sign of b2 is theoretically positive, for a worsening income distribution is expected to increase poverty. In contrast, b4 cannot generally be signed however, it would be negative if there was diminishing poverty-increasing effect of rising inequality.

Explicitly, from equation (2) we can derive the elasticity of poverty by contribution to growth. It is given by:

\[
E_Y = \frac{DP/P}{DY/Y} = \frac{DP}{DY} \frac{Y}{P} = b_1 + b_3 GI \quad (3)
\]

As for the measure of the elasticity of poverty with respect to inequality can be given by the following relation:
\[ E_G = \frac{DP/P}{DG/G} = \frac{DP}{DG_P} = b2 + b4 GI (4) \]

Hence, given the above expected signs, \( E_Y \) and \( E_G \) are generally anticipated to be negative and positive, respectively, so that increasing income growth should reduce the growth of poverty, while inequality acceleration would exacerbate poverty increases.

### 2.2 THE STATIC PANEL METHOD: SPECIFICATION TESTS

Two estimation methods will be used. The first is static, it takes into account the unobserved heterogeneity of the countries in the sample. Individual characteristics may be fixed or random in nature. The Hausman (1978) specification test is used to select one or the other of these specifications. The fixed effect model will be used if the probability attached to the Hausman test statistic is less than 10%. The second method is the Generalized Moments (GMM) in a dynamic panel. In this method, the rate poverty growth delayed during a period of time. It can be considered an exogenous variable.

#### THE STATIC PANEL METHOD: SPECIFICATION TESTS

In our analysis, Fisher's test leads us to reject the null hypothesis that, of inter individual homogeneity. We must therefore favour a model that takes into account individual specifics. Therefore, we will use the Hausman specification test which allows us to test whether this individual effect is fixed or random? The null hypothesis of this test is that the model can be specified with random individual effects. The results show that this heterogeneity is fixed since the Hausman test statistic is less than 10%.

FGLS regression results show that the rate of economic growth, the interaction of the inequality growth and the initial level of inequality have retained their significant statistical importance on the poverty growth, While the rate of inequality growth has negative and non-significant effects.

### Table 1: FGLS estimation result

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>MEF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficients</td>
<td>t-stat</td>
</tr>
</tbody>
</table>

### Poverty growth rate ($DP / Pi, t$)

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$DY / Y$</td>
<td>-10.34 ***</td>
<td>4.54</td>
<td>0.000</td>
</tr>
<tr>
<td>$DG / G$</td>
<td>-1.476</td>
<td>0.54</td>
<td>0.587</td>
</tr>
<tr>
<td>$DY / Y * GI$</td>
<td>6.454 ***</td>
<td>4.62</td>
<td>0.000</td>
</tr>
<tr>
<td>$DG / G * GI$</td>
<td>1.122</td>
<td>0.68</td>
<td>0.495</td>
</tr>
<tr>
<td>Constant</td>
<td>44.63 ***</td>
<td>41.18</td>
<td>0.000</td>
</tr>
</tbody>
</table>

- Observations: 342

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Breusch and Pagan (p-value)</td>
<td>76.03</td>
<td>(0.000)</td>
<td></td>
</tr>
<tr>
<td>Hausman test (p-value)</td>
<td>9.49</td>
<td>(0.0499)</td>
<td></td>
</tr>
<tr>
<td>Ramsye Reset test</td>
<td>(0.6982)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td></td>
<td>20.9%</td>
<td></td>
</tr>
</tbody>
</table>

*** significance at 1%, ** significance at 5%, * significance at 10%

Source: author calculates

**THE DYNAMIC PANEL DATA METHOD**

To introduce the endogenous variable into equation (2) as an explanatory variable in order to make the estimates using the dynamic panel (GMM method), is this obtained:

$$DP / Pi, t = ai + b1 DP / Pi, t-1 + b2 DY / Yi, t + b3 DG / Gi, t + b4 DY / Y * GIi, t + b5 DG / G * GIi, t + \epsilon i, t$$ (5)

The estimation results are presented in the following table.
Table 2: Estimation results in GMM

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>GMM in first difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poverty growth rate (DP / Pi, t)</td>
<td></td>
</tr>
<tr>
<td><strong>DP / Pi, t&lt;sub&gt;1&lt;/sub&gt;</strong></td>
<td>Coefficients t-stat p-value</td>
</tr>
<tr>
<td></td>
<td>0.477 *** 8.7 0.000</td>
</tr>
<tr>
<td><strong>DY / Y</strong></td>
<td>Coefficients t-stat p-value</td>
</tr>
<tr>
<td></td>
<td>-0.7009 * -1.7 0.09</td>
</tr>
<tr>
<td><strong>DG / G</strong></td>
<td>Coefficients t-stat p-value</td>
</tr>
<tr>
<td></td>
<td>6.259 1.14 0.432</td>
</tr>
<tr>
<td><strong>DY / Y * GI</strong></td>
<td>Coefficients t-stat p-value</td>
</tr>
<tr>
<td></td>
<td>0.4238 * 1.69 0.097</td>
</tr>
<tr>
<td><strong>DG / G * GI</strong></td>
<td>Coefficients t-stat p-value</td>
</tr>
<tr>
<td></td>
<td>-3.586 ** -2.00 0.046</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>Coefficients t-stat p-value</td>
</tr>
<tr>
<td></td>
<td>21.86 *** 7.79 0.000</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>327</td>
</tr>
<tr>
<td><strong>Sergan test</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>266.27 (0.000)</td>
</tr>
<tr>
<td><strong>Hensen's test</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0124)</td>
</tr>
<tr>
<td><strong>AR (2)</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.274)</td>
</tr>
</tbody>
</table>

*** significance at 1%, ** significance at 5%, * significance at 10%

Source: author calculates

Hansen's over-identification test proves the use of the dynamic panel and does not reject the validity of the instruments used (p <0.0124). This method solves problems of simultaneous bias. Inverse causality and omit variables that weakened the results of previous studies and to remedy the endogenous problem bias of the explanatory variables through instrumental variables generated by their delays.
Unlike the first method, the dynamic panel method gives an efficient estimate of the model cited above. This method generates an elasticity of poverty by contribution to growth equal to:

\[ E_Y = -0.7 + 0.42 \text{ GI} \] (5)

And the elasticity of poverty with respect to inequality, it can be given by the following relationship:

\[ E_g = 6.25 - 3.5 \text{ GI} \] (6)

We deduce from relation (5) that this elasticity (in absolute value) decreases with the initial level of inequality (Bourguignon, 2003; Epaulard, 2009; Fosu, 2015). For countries with low initial level of inequality, the impact of economic growth on poverty reduction is stronger than countries with high inequality. Growth is more inclusive and better able to accelerate poverty reduction if the level of inequality is low.

Similarly, from (6) we deduce that countries with lower initial inequality levels or larger incomes relative to the poverty line would also possess higher values of the inequality elasticity.

Thus, the examination of table (2) shows that the coefficient associated with the variable DY / Y (growth variation) is negative and significant at the threshold of 10% (P = 0.09). This coefficient indicates that an increase in growth significantly reduces poverty. The coefficient corresponding, to the variable DG / G (the variation in the level of inequality) is positive and not significant. Thus, the coefficient of DY / Y * G is positive and significant, which implies that an initial level of inequality decreases the effect of growth on poverty reduction. Finally, the sign that represents the impact of the variation of inequality on poverty, for a given initial inequality, is negative and significant.

In the majority of SSA countries, growth was the major factor behind falling or increasing poverty, inequality, nevertheless, played the crucial role in poverty behavior in a large number of countries. Even in those countries where growth has been the main driver of poverty-reduction, further progress could have occurred under relatively favorable income distribution. For more efficient policy making, therefore, idiosyncratic attributes of countries should be emphasized. In general, high initial levels of inequality limit the effectiveness of growth in reducing poverty while growing inequality increases poverty directly for a given level of
growth. It would seem judicious, therefore, to accord special attention to reducing inequality in certain countries where income distribution is especially unfavorable.

CONCLUSION

We tried with two econometric models to decompose the variation of poverty. The results found in SSA countries over the period (2001-2020) support the hypothesis that growth alone is not enough to reduce poverty. Moreover, growth reduce poverty (according to a multidimensional vision). However, this incident is limited by the inequality observed in this region. Indeed, the inequality effect is more important than the growth effect.

The focus on lower poverty needs a central space in the policy and planning practices in SSA countries. It is essential for these countries to stimulate their growth, by making them more sustainable and inclusive. Thus, these countries must have mechanisms to control inequalities and put in place more effective and efficient redistribution policies. The appropriate pro-poor growth strategies also require some understanding of idiosyncratic country attributes. After all, policies are by and large country-specific, there are substantial differences in the abilities of countries to translate economic growth to poverty reduction, based on their respective inequality and growth profiles. This transformation findings by country, at least, provide a ‘road-map’ for undertaking country studies to uncover the underpinning idiosyncratic factors. Understanding such country-specific profiles is crucial in crafting polices for most effectively achieving poverty reduction globally.

This work is limited to only SSA countries by ignoring the other countries major realize a high-level of growth. Future research may focus on using another poverty in dice to develop more sustainable and reliable policies on pro-poor growth and may also consider the COVID-19 pandemic variable in their analyses.

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