

L'impact de la Croissance Économique sur la Pauvreté et L'inégalité Dynamiques en Afrique: effets de réciprocité

Impact of Economic Growth on Poverty and Inequality Dynamics in Africa: reciprocity effects

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Date de soumission : 12/06/2021

Date d'acceptation : 30/07/2021

Pour citer cet article :

NAQAR I. & El BAKOUCHI M. (2021) «L'impact de la Croissance Économique sur la Pauvreté et L'inégalité Dynamiques en Afrique : effets de réciprocité », Revue Internationale des Sciences de Gestion « Volume 4 : Numéro 3» pp : 660 – 685.



Abstract

The relationship between economic growth and poverty is a topic of crucial interest. It has therefore become essential to know whether, in fact, growth in developing countries is helping to reduce poverty and inequality, or if it is amplifying it.

This paper proceeds to test empirically the relationship between growth, poverty and inequality. An empirical analysis of the economic growth impact on poverty and inequality as well as that of poverty on economic growth and inequality. Our analysis was done on a non-cylindrical panel of 28 African countries. The main variables were the absolute poverty rate at \$1.25, GDP per capita and the Gini index. To these variables we added the net official development assistance received per capita, the population growth rate and indicators of good governance (corruption, Government effectiveness, and political stability).

Keywords: Economic growth; poverty; inequality; panel data; reciprocity effect .

Résumé

La relation entre la croissance économique et la pauvreté est un sujet qui revêt d'un intérêt crucial. Il est donc devenu important de savoir si, effectivement, la croissance dans les pays en développement aide à réduire la pauvreté et les inégalités, ou si au contraire elle l'amplifie.

Cet article a pour principal but de tester la relation empirique entre croissance, pauvreté et l'inégalité. Une analyse empirique de l'impact de la croissance économique sur la pauvreté et l'inégalité mais aussi de la pauvreté sur la croissance économique et l'inégalité. Notre analyse a été faite grâce à un panel non cylindrique sur 28 pays africains. Les variables principales seront le taux de pauvreté absolue à \$ 1.25, PIB par habitant et l'indice de GINI. A ces deux variables nous avons ajouté l'aide publique au développement nette reçue par habitant, le taux de croissance de la population et les indicateurs de bonne gouvernance (corruption, efficacité du gouvernement, et la stabilité politique).

Mots clés : Croissance économique ; pauvreté ; inégalité ; données en panels ; effets de réciprocité



Introduction

In recent decades, high levels of poverty in Africa and related development issues have been a major focus of the development literature on the continent. Despite recent technological achievements and economic progress, poverty remains an issue of concern. While not sparing a handful of industrialized countries, it continues to plague entire regions of the world.

According to the World Bank's report on poverty and shared prosperity, the African continent now accounts for half of the world's extreme poverty. (World Bank, 2018).

For a long time, the issue of economic growth, poverty and inequality has been at the heart of economic debates and has been the subject of several empirical works. This issue is of major interest to economists and econometricians to explore plausible solutions as well as to implement programs to fight poverty and inequality, as well as to measure their impacts on growth.

In the early 1970s, the vulnerability of most African economies became apparent. Macroeconomic balances were breaking down: budget deficits, suffocating debt, galloping inflation and chronic trade deficits. In short, the picture was catastrophic. (Dwight H Perkins, et al). As early as September 1983, Africa was forced to resort to IMF programs in order to redress these imbalances while aiming, in the long term, at strong and sustained economic growth. The implementation of this program was accompanied by that of economic and institutional reforms, including those related to the gradual State disengagement and the economy liberalization.

The relatively mixed results of structural adjustment policies implemented during the 1990s in developing countries fundamentally changed the general discourse on development issues. From now on, the issue of poverty appears explicitly on the agenda of international institutions and States. In the same way, social aspects must also be taken into account together with economic aspects in the fight against poverty. It has been chimerical to believe that economic growth alone could meet the needs of development and the fight against poverty. This inadequacy is now well recognized and the fate of the country's poor can no longer be left to the sole process of economic growth, which is so volatile and uncertain, and even less so when its results are poorly distributed and not in favor of the poor. (Abdel-Khalek Touhami, 2011) Certainly, it is commonly accepted today that the world is experiencing a fundamental paradigm shift in the language of development so as to say that inequality is not limited to the poorest of the poor, but can affect up to 50% of the population; that inequality is a violation of human rights; and that a more equitable distribution of income, far from being a brake on economic



growth, is one of its drivers. (Millennium Development Goals, Achievement Fund Report, 2011).

Similarly, it must be noted that the issue of inequality has been relegated to the background in recent decades due to the lack of reliable time series data on the evolution of income distribution in African economies, which makes it more difficult to identify the determining factors underlying these trends.

The relationship between economic growth and poverty and inequality is a critical issue. Is economic growth always at the service of people and all people? This broad question, the subject of intense controversy and debate, is fundamental in a context where growth is often a goal in itself for countries.

This research attempts to expose the two-way relationship between economic growth and absolute poverty. The aim is to analyze how these phenomena influence each other in a panel of 28 African countries spanning the period from 1996 to 2015. The principle of the estimation method, which consists of multiple linear regression on panel data with its different variants in the Growth-Inequality-Poverty triangle model, is explained. The first step is a descriptive analysis of the statistical characteristics of these variables and the presentation of the different results of our model on the links between the components of the IPC triangle as well as their interpretations. It was deemed useful to introduce other explanatory variables inherent in the quality of institutions, the Government effectiveness, corruption, development aid, population growth, and political stability to better explain the triangle and to estimate which variables have the greatest impact on growth and poverty (reciprocity effect), in which direction and with how much intensity.

1. Empirical estimation of the relationship between growth, inequality and poverty

Many econometric models, especially in the field of macroeconomic policy, can be confronted with panel data. The particular nature of these data calls for the consideration of specifications and estimation methods that are adapted to them. Thus, various models have been proposed in the literature, mainly the OLS method, fixed effects models and random effects models.

1.1. Descriptive analysis of the variables and the selected models.

1.1.1. Descriptive statistics:

It can be seen from the figure 1 that the sample contains 82 complete observations of the three variables. The "GDP per capita" has a mean of 3161.918 (constant 2005 international PPP\$), with a relatively smaller standard deviation of 28497.9 (constant 2005 international PPP\$). On



the other hand, the "Gini" variable for the level of inequality has a mean almost identical to the previous table of 43.97 and a relatively higher standard deviation of 7.92. Finally, the "poverty" variable has a mean very close to that of the complete observations of 45.03 and a standard deviation of 24.8.

Table 1: Statistical characteristics of the "GDP per capita",

"Inequality" and "Poverty" variables

•	sum	pib	hab	gini	pauvrete
---	-----	-----	-----	------	----------

Variable	Obs	Mean	Std. Dev.	Min	Max
pib_hab	82	3161.918	2849.695	455.6622	11447.44
gini	82	43.9722	7.928556	29.83	67.4
pauvrete	82	45.03024	24.79021	.74	87.67

Source: Author's calculation with STATA software

1.1.2. Correlation of variables:

We can see from table 2 that the two variables "per capita GDP" and "poverty" are positively but weakly correlated with the "gini" variable (0.22), whereas the two variables "per capita GDP" and "poverty" are inversely correlated with each other with a relatively strong correlation coefficient (-0.66)

Table n° .2: Correlation of the variables "GDP per capita", "Inequality" and "poverty".

. corr pib_hab gini pauvrete (obs=82)

	pib_hab	gini	pauvrete
pib_hab	1.0000		43
gini	0.2215	1.0000	
pauvrete	-0.6622	0.2180	1.0000

Source: Author's calculation with STATA software



1.1.3. Distribution of the selected variables

The distribution of the selected variables is as follows:

Figure1: Distributions of the "GDP per capita", "Inequality" and

"Poverty" variable



Source: Author's calculation with STATA software





Revue Internationale des Sciences de Gestion ISSN : 2665-7473 Volume 4 : Numéro 3





Source: Author's calculation with STATA software

It is relevant to note that the modal class (class with the highest frequency) for the "GDP_cap" variable is the first lowest GDP per capita class (the one furthest to the left on the x-axis) and that the majority of the GDP per capita classes are contained to the left in the lowest GDP per capita bands. For the "GINI" variable, the majority of densities are concentrated in the middle with a decreasing trend from gini = 0.4. Finally, the density of the poverty variable is distributed between 0 and 90 with oscillating values between these two extremes.

1.1.4. Inter and intra-individual analysis

The average GDP per capita for the entire sample is 3306.52. The intra-individual standard deviation (within) is equal to 1119.75, while the inter-individual standard deviation (between) is equal to 2829.3 out of a total standard deviation of 2997.93, i.e. 94.37% of the total standard deviation. This is explained by the importance of the individual dimension in our sample (28 countries) compared to the temporal dimension (19 years).



Table	3 : Ca	lculation	of intra	-individı	ıal (temp	oral)	and in	ter-individual	(individual)
varian	ces		of		"GDP			per	capita
. xtset	code annee anel varia time varia de	e, yearly able: code able: annee alta: 1 year	(strongly ba , 1996 to 20 r	alanced))14					
. xtsum	pib_hab								
Variable		Mean	Std. Dev.	Min	Max	Obse	rvations		
pib_hab	overall	3306.652	2997.934	<mark>455.6622</mark>	22903.28	N =	532		
	between within		2829.333 1119.752	731.9757 996.71	10748.82 23082.6	n = T =	28 19		

Source: Author's calculation with STATA software

The average Gini index for the whole sample is 44. The intra-individual standard deviation (within) is equal to 3.25, while the inter-individual standard deviation (between) is equal to 7.38 out of a total standard deviation of 7.88, i.e. 93.65% of the total standard deviation. This is explained by the importance of the individual dimension in our sample (28 countries) compared to the temporal dimension (19 years).

Table4:	Calculation of	intra-individual	(temporal)	and	inter-individual
(individual)	varia	nces	of		"Inequalities
. xtsum gini					

Variab	le	Mean	Std. Dev.	Min	Max	Observations
gini	overall	<mark>43.9925</mark> 3	7.88224	29.83	67.4	N = 83
	between		7.383483	31.14333	62.77	n = 28
	within		3.257154	3 <mark>4</mark> .71086	51.98253	T = 2.96429

Source: Author's calculation with STATA software



Table 5: Calculation of intra-individual (temporal) and inter-individual(individual) variances of "poverty

. xtsum pauvrete

Variable		Mean	Std. Dev.	Min	Max	Observation:
pauvrete	overall	44.71071	24.72141	.74	87.67	N = 81
	between		22,6059	1.985	83.875	n = 20
	within		7.481686	28.3627	71.90071	T = 3.0357

Source: Author's calculation with STATA software

The average poverty index for the whole sample is 44.71. The within standard deviation is equal to 7.48, while the between standard deviation is equal to 22.6 out of a total standard deviation of 24.72, which is 91.5% of the total standard deviation. This is explained by the importance of the individual dimension in our sample (28 countries) compared to the temporal dimension (19 years).

2.2. Evolution of the different explanatory variables

We present here the evolution of the different explanatory variables of our model. GDP per capita :



		Figure	2: Evolut	ion of	GDP/capita	between	1996 and	l 2015
	00000	Afrique du Sud	Angola	Burkina Faso	Burundi	Cameroun	Central African Republic	
	0 1000200							
	00000000	Congo. Rep.	Côte d'Ivoire	Ghana	Kenya	Madagascar	Malawi	
9	0 0	Mali	Maroc	Mauritanie	Mozambique	Namibia	Nigéria	
pib_ha	0 10002000							
	000000000	Ouganda	Rwanda	Swaziland	Sénégal	Tchad	Togo	
	-					1995 2000 2005 2010 2015	1995 2000 2005 2010 2015	
	00500000	Tunisie	Zambie	Ègypte	Êthiopie			
	2 0 199	95 2000 2005 2010 2015	1995 2000 2005 2010 2015	1995 2000 2005 2010 20	115 1995 2000 2005 2010 2015			
	Gra	phs by pays1		an	nee			

Source: Author's calculation with STATA software

- Gini Index:



Figure 3: Changes in the Gini index between 1995 and 2015.





Poverty index:

Afrique du Sud	Angola	Burkina Faso	Burundi	Cameroun	Central African Republic
9		-			
-				\sim	
Corgo. Rep.	Côte d'Ivoire	Ghana	Kenya	Madagascar	Malawi
8				\sim	-
	_		/		
Mali	Maroc	Mauritanie	Mozambique	Nambia	Ngéra
8			-		
-				_	
Ouganda 8.4	Rxanda	Swazland	Sénégal	Tchad	Тара
8	-	~		_	
			_		
				1968 2000 2008 2010 20	015 1996 2000 2005 2010 201
Tunisie	Zamble	Egypte	Ethiopie		
8			-		
			+ + + + + + + + + + + + + + + + + + + +		
1946 2000 2005 2010 2015	1995 2000 2005 2010 2015	1966 2000 2005 2010 2015	1965 2000 2005 2010 2015		
Graphs by pays1		Year			

Figure 4: Evolution of the poverty index by country between 1995 and 2015

Source: Author's calculation with STATA software



Figure 5: Heterogeneity of GDP per capita between countries





Figure 6: Heterogeneity of Gini indices of inequality between countries

Figure7:Heterogeneityofpovertyacrosscountries



The above results indicate heterogeneity across countries. This heterogeneity highlights the importance of studying individual countries. This is due to the importance of the individual dimension in our sample (28 countries) compared to the temporal dimension (19 years). Within each country, the relationship between growth, poverty and inequality is undoubtedly influenced by issues such as natural resource dependence, corruption, political stability and governance.



country»

- Corruption :

1.22000			200200		-	11270/2020/021100/0
Afrique o	tu Sut	Angola	Burkina Faso	Bund	Cameroun	Central African Republic
~	~		m			
		~~~~		~~~~		~~~~
Corgo	Rec	Câte d'Ivaire	Qtana	Kanya	Madagastar	Malavi
~	~	<u></u>	~~~		~~~~	2-
Ma	-	Marco	Maurtanie	Macambique	Namba	Ngira
~	~	~~~	S	~~~~	m	~~
Ouga	rda .	Rxanda	Svapland	Sénégal	Tohad	Таро
~~	~	W	$\sim$	m	~~~	~~~~
					196 200 205 210 20	1 196 200 205 201 201
Turk	54	Zante	Egypte	Ettope		
~	~~~	~~~	~~~	~~~		
HE 200 20	1 20 20	98 202 203 200 201 19	6 206 208 200 XV	1 100 200 200 201 201		
			Year			

#### Figure 8: evolution of the "corruption" indicator

Source: Author's calculation with STATA software



#### - Government effectiveness (gov_effectiv):



#### Figure 9: Evolution of the "government effectiveness" indicator by

Source: Author's calculation with STATA software





#### Public development aid:

### Figure 10: Evolution of public development aid

#### **Population growth**

_

Figure 11: Evolution by country of the "population growth" indicator between 1995 and 2015

24	Afrique du Sud	Angola	Burkina Faso	Bound	Cameroun	Central African Republic
1						
	Corgo Rep	Câte d'Ivore	Ohana	Kenys	Madagescar	Matavi
*						
		~ ~				~~~
-						
=+	Mati	Maroo	Mauritanie	Mozambique	Nambia	Ngéra
-					~	
~ 1	Ouganda	Rearda	Seapland	Sérégei	Tohad	Toge
		A				
1		· \	~			
- 7.1						TIS 1968 2000 2008 2010 201
	Tunisie	Zantre	Égypte	Ethiopie		
	and and and and	1946 2000 2008 2010 2013				
			Voor			

Source: Author's calculation with STATA software



#### - Political stability (pol_stab)



#### Figure 12: Evolution of the "political stability" indicator by country

Source: Author's calculation with STATA software

#### 2. Panel data regressions of the CPI triangle: reciprocity effects

The analysis of the phenomenon of inequality and poverty in Africa cannot be well understood without defining the different factors that have influenced them. To this end, we will estimate a panel data model for a set of African countries. The methodology applied in this paper is the same as that used by Marion Englert in her paper published on 2007. The methodology used in this paper is the same as the one used by Marion Englert in her 2007 work, but of course we have adapted it to our case.

$$Y_{it} = \alpha_i + \beta X_{it} + \varepsilon_{it}$$



i = 1,..., N represents the "individuals" (countries) and t = 1,..., T represents time (years);

Y_{it} represents the dependent variable that varies with country and time;

 $\alpha_i$  represents individual heterogeneity, i.e., individual effects that vary with country, and are fixed over time;

X_{it} represents the explanatory variables that varies with country and time;

 $\varepsilon_{it}$  is the error term.

For our case, it would be more realistic to assume heterogeneity of individual effects. Indeed, the countries in our sample have institutional differences that may influence poverty levels, apart from the effect captured by the explanatory variables. The effects of omitted or unobservable variables are therefore not reasonably homogeneous for each country. It is therefore useful in our case to take these individual effects into account, in order to conduct a more detailed analysis of our explanatory variables and to be able to draw more rigorous and relevant conclusions.

Thus, we have two choices of model: the fixed effects model and the random effects model. These models are distinguished by their relationship to heterogeneity.

#### **2.1.** Poverty as a variable to be explained:

#### 2.1.1. Fixed-effect model

 $Povertyi, t = \tau i, t + \beta 1 p ib_hab i, t + \beta 2 g inii, t + \beta 3 corrup + \beta 4 g ov_effectiv + \beta 5 p ol_stab + \beta 6 a p d_hab + \beta 7 croiss_dem + \epsilon i, t$ 

With:

i: the individual or country

t: the period or the year

τi,t: constant term for individual i

 $\beta i$  = Coefficients of the selected explanatory variables, i=1,2,3,4,5,6,7

εi,t = Intra-individual error term. i=1,..., N represents countries (individuals) t=1,..., Ti represents time (years)



The specification of this model can be presented as follows:

### $log_pauv_{i} = \alpha + \beta_1 log_p ib_{i} + \beta_2 log_p in_{i} + \beta_3 log_a pd_{i} + \beta_4 log_d emo_{i}$ + $\beta_5$ corruption_i. + $\beta_6$ gorvernment_eff_i. + $\beta_7$ politic_stab_i. + + $u_{it}$ $+ \varepsilon_{it}$

$$\varepsilon_{it} = \alpha_i + u_{it}$$

log_pauv_{i.} : the individual (country) average of the logarithm of the poverty rate; etc.

log_pauv_{it} : the logarithm of the poverty rate

 $\alpha$ : the constant, common for all years to all individuals

log_pib_{it} : the logarithm of GDP per capita

log_apd_{it} : the logarithm of development aid

log_demoit : the logarithm of population growth

corruption_{it} : the logarithm of the corruption indicator

 $gorvernment_eff_{it}$ : the logarithm of the government effectiveness indicator

politic_stabit : the logarithm of the political stability indicator

The results of the Fixed-effect model are summarized as follows: .

Table 6: Regression 1: "between" fixed effect model, poverty as	an
endogenous variable	

log_pauv	Coefficient	Probabilities
log_pib	485365	0.296
log_gini	2.637173	0.000
log_apd	.1386175	0.342
log_demo	.3652606	0.343
corruption	.7355531	0.035
gorvernment_eff	8133134	0.124
politic_stab	0817126	0.730
α	6.280392	

 $R^2$ : within = 0.1760 Prob > F = 0.2294

Number of observations = 82

**Revue Internationale des Sciences de Gestion** ISSN : 2665-7473 Volume 4 : Numéro 3



between 
$$= 0.5954$$
  
overall  $= 0.5645$ 

These results indicate that the differences in poverty between countries in this fixed-effect model are not explained by differences in the level of growth, population growth and quality of governance, and political stability between countries. Instead, differences in the level of inequality and corruption are explanatory factors for the difference in poverty between countries, as these variables are statistically significant.

#### 2.1.2. Random effect model

The specification of the model is as follows:

$$\begin{split} log_pauv_{it} &= \alpha + \beta_1 log_pib_{it} + \beta_2 log_gini_{it} + \beta_3 log_apd_{it} + \beta_4 log_demo_{it} \\ &+ \beta_5 corruption_{it} + \beta_6 government_eff_{it} + \beta_7 politic_stab_{it} + \varepsilon_{it} \end{split}$$

 $\varepsilon_{it} = \alpha_i + u_{it}$ 

With :

i : the individual or the country

```
t : the period or the year
```

 $\tau$ : Constant term for individual i

 $\beta i$  = Coefficients of the selected explanatory variables, i=1,2,3,4,5,6,7

εi,t = Intra-individual error term. i=1,..., N represents countries (individuals) t=1,..., Ti represents time (years)

ui,t = Inter-individual error term. i=1,..., N represents countries (individuals) t=1,..., Ti represents time (years)

The results of the Random Effects Model are summarized as follows:

Table n°7: Regression 2: Random effects model, poverty as endogenous variable

log_pauv	Coefficient	Probabilities



log_pib	-4.01028	0.011	
log_gini	1.057927	0.000	
log_apd	.0741732	0.470	
log_demo	.816689	0.004	
corruption	.8262633	0.016	
gorvernment_eff	-1.054498	0.002	
politic_stab	0443165	0.771	
α	5.423978	0.000	

 $R^2$ : within = 0.1547 Prob > chi2 = 0.0000 Number of observations = 82 between = 0.6657 overall = 0.6065

The results differ from those of the fixed effects model. Here the corruption indicator becomes statistically significant at the 5% level. Growth, inequality and government effectiveness also have a significant effect on poverty.

We also notice that the influence of population growth and corruption has increased. The coefficients of these variables have increased slightly from their values in the fixed effects model. However, official development assistance and political stability remain statistically insignificant. Also, the signs of the relationships do not change; the different variables follow the theory.

Growth and government efficiency do indeed help reduce poverty, while inequality, population growth, and corruption tend to increase it.

The Hausman and Sargan overidentification test accepts the hypothesis of no correlation between the individual random term ui and the explanatory variables of the growth-inequality-poverty (GIP) model because the p-value= 0.6907 > 0.05. The estimators of the compound error or random effect model are unbiased. Therefore, these RE estimators are used for our model. The random effects model is more suitable for models with poverty as the variable to be explained. The coefficients estimated with this random effects model are the most efficient.

We can therefore specify our model as follows:



$$\begin{split} log_pauv_{it} &= \alpha + \beta_1 log_pib_{it} + \beta_2 log_gini_{it} + \beta_3 log_apd_{it} + \beta_4 log_demo_{it} \\ &+ \beta_5 corruption_{it} + \beta_6 gorvernment_eff_{it} + \beta_7 politic_stab_{it} + \varepsilon_{it} \end{split}$$

 $\varepsilon_{it} = \alpha_i + u_{it}$ 

The results of this model are as follows:

log_pauv	Coefficient	Probabilities
log_pib	-4.01028	0.011
log_gini	1.057927	0.000
log_apd	.0741732	0.470
log_demo	.816689	0.004
corruption	.8262633	0.016
gorvernment_eff	-1.054498	0.002
politic_stab	0443165	0.771
α	5.423978	0.000

Table n°8 :	<b>Random effects</b>	model, povert	v as endogenous	variable
I GOIC II O I	1tuna oni enteeto	mouch porte	, as chaogenous	

 $R^2$ : within = 0.1547 Prob > chi2 = 0.0000 Number of observations = 82 between = 0.6657

overall = 0.6065

In this model, government growth and efficiency have a significant effect on poverty. Growth and government effectiveness do indeed help reduce poverty in Africa, while inequality, population growth and corruption tend to increase it. However, the effect of official development assistance and good governance on poverty in Africa is not certain.

#### **2.2.** Growth as a variable to be explained:

#### 2.2.1. Fixed effects model

The specification is as follows:

$$\begin{split} log_pib_{i.} &= \alpha + \beta_1 log_pauv_{i.} + \beta_2 log_gini_{i.} + \beta_3 log_apd_{i.} + \beta_4 log_demo_{i.} \\ &+ \beta_5 corruption_{i.} + \beta_6 gorvernment_eff_{i.} + \beta_7 politic_stab_{i.} + \varepsilon_{i.} \end{split}$$



The results of the model are displayed as follows:

Table n°9: Regression	3: Fixed-effects r	nodel, growth	as an endogenous	variable
8		/ 0	8	

log_pib	Coefficient	Probabilities
log_pauv	-0.0560925	0.296
log_gini	3.181742	0.003
log_apd	.1625117	0.000
log_demo	1710647	0.189
corruption	1.180687	0.430
gorvernment_eff	-0.1181752	0.516
politic_stab	0.1810293	0.020
α	7.444992	0.000
$R^2$ : within = 0.3809 Pr	ob > F = 0.0027	Number of observations = 82

between = 0.1156overall = 0.0760

These results indicate that differences in growth between countries are not explained by differences in poverty levels. In other words, for the fixed effects model, poverty does not have a significant effect on growth. On the other hand, differences in the level of inequality (Bourguignon (2008), public aid for development and good governance indicators are explanatory factors for growth. All these variables are statistically significant.

#### 2.2.2. Random effects model

We can specify our model as follows:

# $log_pib_{it} = \alpha + \beta_1 log_pauv_{it} + \beta_2 log_gini_{it} + \beta_3 log_apd_{it} + \beta_4 log_demo_{it} + \beta_5 corruption_{it} + \beta_6 gorvernment_eff_{it} + \beta_7 politic_stab_{it} + \varepsilon_{it}$

The model results are summarized as follows:

# Table n°10: Regression 4: Random-effects model, growth as an endogenous variable

log_pib	Coefficient	Probabilities
---------	-------------	---------------



log_pauv	1017195	0.061
log_gini	.0523478	0.0731
log_apd	.1463357	0.001
log_demo	3075233	0.018
corruption	1335016	0.388
gorvernment_eff	.0756296	0.672
politic_stab	.1209039	0.105
α	7.840904	0.000
$R^2$ · within = 0.3369 Prob	> chi2 = 0.0000 Numb	er of observations = 82

 $R^2$ : within = 0.3369 Prob > chi2 = 0.0000 Number of observations = between = 0.3854

overall = 0.3631

It comes out from the results of the random-effects model that the poverty indicator and the gini index are statistically insignificant at the 5% level. However, the poverty variable remains significant at 10%. Indeed, for a 1% increase in poverty, there is a decrease in growth of -0.1%, which is not negligible.

#### Commentary on the results and conclusion

Official development assistance has a positive effect on economic growth. This indicates that at the inter-individual level, official development assistance has a positive effect on the growth of African countries. The effectiveness of ODA was challenged during the 1990s: capital accumulation was no longer seen as the alpha and omega of development (Devarajan et al., 2002), whereas it had been considered by the "pioneers" as a necessary condition for development. Thus, concerns about the effectiveness of aid in terms of growth and poverty reduction have increased as a result of its failure in the most assisted countries, particularly those in Sub-Saharan Africa. In addition, the perverse effects of aid have been widely recognized: incitement to corruption, clientelism, eviction of national savings, encouragement of useless spending, making the Governments dependent on aid, etc. (Gérard Azoulay, 2011).

Faced with this situation, the World Bank has emphasized the importance of the institutional environment and the economic policy choices of recipient countries.

The effectiveness of aid in terms of growth depends on the quality of economic policies. Several voices advocate targeting aid to countries with "good" economic policies (reform, performance-



based management, efficiency, etc.). Countries with "bad policies" and uncertain commitment to reform should receive little or no financial assistance.

Population growth has a statistically significant negative effect on growth. Economic growth has not been able to keep up with the magnitude of social needs, including population growth. This reflects the very low capacity of the African economy to create enough jobs to absorb the effects of population growth and to allow for the professional integration of youth. In other words, the conditions are undoubtedly in place for Africa's economic takeoff, but the creation of sustainable jobs and a true formal economy requires policy changes. In this respect, investments must focus on human resources: without a competitive and qualified workforce, there will be no benefits from new technologies for Africa. Clearly, education at all levels is one of the major challenges for the future of the African continent.

Linked to this last aspect, the geopolitical stability of Africa is another prerequisite to take into account. It is, therefore, essential that the conflicts' intensity in Africa continues to decrease in the long term so as not to disrupt the new situation and compromise its chances for development.

In contrast to the previous models, the result of the Hausman test indicates that the fixed effects model is more relevant than the random model because the p-value= 0.01 < 0.05.

Overall, we can draw several lessons from this empirical analysis. Growth, inequality, and Government effectiveness also have a significant effect on poverty. Growth and government efficiency help reduce poverty, while inequality, population growth and corruption tend to increase it.

Poverty, in turn, is a handicap to growth. This relationship between the two variables thus follows the theoretical assumptions. On the other hand, income inequality evolves in the same direction as poverty and has a positive effect on growth. Finally, the other exogenous variables have a more or less expected effect on poverty. Official development assistance and good governance have an "uncertain" effect on growth in Africa. OECD experts suggest thinking locally, decentralizing to focus on natural basins of activity. Urbanization is concomitant with development, but overpopulated cities are counterproductive. Beyond 6 million inhabitants, a city generates more impoverishment than improvement in living standards.



Among African countries experiencing sustained growth over the past 15 years, Ethiopia has been the most successful in spreading wealth at the household level. This is probably partly because it has benefited from a certain degree of political and social stability. This is both a condition for and a consequence of shared development, which is called inclusive growth.

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