Urbanization, economic growth and income inequality in Sub-Saharan Africa

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Abstract: The purpose of this study is to analyse the role of economic growth in the relationship between urbanisation and income inequality in Sub-Saharan Africa. Methodologically, we apply the generalised method of moments to a sample of 33 Sub-Saharan African countries. The findings indicate that economic growth mitigates the exacerbating effect of urbanisation on income inequality. On the other hand, inflation and the labour force participation rate are sources of income inequality. Thus, urbanisation will only reduce income inequality in Africa if it stimulates economic growth. In terms of implication, the authorities must strengthen their strategies in favour of the sanitation of urban areas. Smart city strategies can also be adopted to make cities more inclusive.

Keywords: Economic growth, Income inequality, Urbanization.

1. Introduction

The OECD's report on the dynamics of urbanisation in Africa [1] reveals that urbanisation is progressing in both developed and developing countries. The proportion of the world's urban population is expected to rise from 47% in 2000 to around 57% in 2050. More than 90% of future population growth will be in the major cities of developing countries. In the developing world, Africa has experienced the strongest urban growth over the last two decades, at 3.5% per year, and this rate of growth is expected to continue until 2050.

The virtues of urbanisation were initially sought on the side of economic growth [2][1]. Yet urbanisation in Africa has only led to a proliferation of shanty towns, urban poverty and growing inequalities. Most cities in sub-Saharan Africa are characterised by a lack of basic social services, particularly in low-income areas. Only 20% of the population of sub-Saharan Africa has access to electricity and, in 2010, 3% and 53% of Africans had access to a fixed or mobile telephone, respectively; 84% of the continent's city dwellers have access to drinking water and 54% to sanitation [1]. More generally, 60% of African citizens live in areas with inadequate water supply and sanitation. Inequality in African cities remains the second highest in the world, with an average Gini coefficient of around 0.58, well above the average of 0.4 [1].

The dynamics of urbanisation therefore favour the emergence of challenges and opportunities linked to inequalities [3]. Wu and Rao [4] conclude that inequalities are less exacerbated in high-income

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[1] Urbanisation has several effects on economic growth. Firstly, cities play an important role in the structure of the economy and society of both developed and developing countries, offering people the opportunity to benefit from education, employment and good health. Secondly, urbanisation involves the agglomeration of people and businesses and reduces production costs. Thirdly, the concentration of people and businesses in cities facilitates access to finance, the promotion of business ideas and the existence of a larger local market.

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regions due to significant migratory flows. Wei et al [5] analysing the spatial patterns and dynamics of urban land expansion in China, find that urban land expansion generates intra-provincial and intra-prefectural inequalities. Sulemana *et al.* [6] use an unbalanced panel dataset for 48 sub-Saharan African countries over the period 1996-2016 to examine whether urbanisation is correlated with income inequality and find evidence of a positive correlation between urbanisation and income inequality in the region. In contrast, Liddle [7], using cross-sectional regressions, finds that urbanisation does not significantly influence inequality. Other studies have sought to verify the Kuznets hypothesis. Maket *et al.*[8] investigate the existence of a significant relationship between urban agglomeration and income inequality for 22 sub-Saharan African countries from 2000 to 2020. The results revealed a non-linear relationship between urban agglomeration and income inequality in sub-Saharan Africa. On the other hand, Adams and Klobodu [9], based on PMG estimation techniques, find no evidence in favour of the Kuznets hypothesis for 21 Sub-Saharan African countries over the period 1984-2014.

The literature is inconclusive on the nature of the relationship between urbanisation and income inequality in Africa. This study supports the view that the relationship between urbanisation and income inequality is non-linear, using an indirect approach. The aim of this study is therefore to analyse the role of economic growth in the relationship between urbanisation and income inequality in Sub-Saharan Africa.

2. Literature review

The theoretical framework for explaining the link between urbanisation and income inequality is the Kuznets model [10]. The basic argument of this theory is that income inequality increases in the early stages of development and decreases in the later stages. Two arguments are put forward: i) the average per capita income of the rural population is generally lower than that of the urban population; ii) the inequality in percentage shares within the distribution for the rural population is slightly narrower than for the urban population. These arguments complement those of Lewis [11]. The high income of urban dwellers allows them to save and invest in productive enterprises, while the working class and rural dwellers are consumption-oriented because of their low income. Inspired by these studies, Robinson [12] proposed a model to understand the relationship between urbanisation and income inequality. He assumed that the economy had subsistence and capitalist structures characterised by low-wage agricultural sectors and high-wage non-agricultural sectors. He then argued that, in the absence of compensatory policies and for a prolonged period, a developing country should expect income inequality to increase or remain unchanged during its intermediate phase of economic development. If rural people migrate to urban areas with little or no education and skills that match the requirements of urban firms, they risk either becoming unemployed or having to take jobs that pay significantly lower wages, thereby widening the wage gap [13]. However, if rural migrants manage to get jobs in the formal sector in urban areas, urbanisation could reduce income inequality [13].

Empirically, Kanbur and Zhuang [14] conclude that urbanisation accentuates income inequalities in Asia. For Pouyanne [15], unplanned urbanisation is a form of urban sprawl characterised by the coexistence of housing inequalities. Su et al [16], applying Granger's bootstrap causality, find that levels of urbanisation have a significant impact on income disparities between urban and rural areas. Chen *et al.* [17], using a sub-sample of the 2005 Chinese population census, conclude that population size and migration to urban cities increase income inequality. Wu and Rao [4] conclude that inequality is less exacerbated in high-income regions due to significant migration flows. Wei *et al* [5], analysing the spatial patterns and dynamics of urban land expansion in China, find that urban land expansion generates intra-provincial and intra-prefectural inequalities. Sulemana *et al* [6] use an unbalanced panel dataset for 48 sub-Saharan African countries over the period 1996-2016 to examine whether urbanisation is correlated with income inequality. They find a positive relationship between urbanisation and income inequality in the region. Liddle [7], using cross-sectional regressions, finds that urbanisation does not significantly influence inequality.

This relationship has also been studied in terms of non-linearity on the basis of verification of the Kuznets hypothesis. Maket *et al.* [8] investigate the existence of a significant relationship between urban agglomeration and income inequality for 22 sub-Saharan African countries from 2000 to 2020. The results revealed a non-linear relationship between urban agglomeration and income inequality in sub-Saharan Africa. The results show that income inequality increases with urban development in the first phase and decreases in later phases of urbanisation. In contrast, Adams and Klobodu [9], based on PMG estimation techniques, find no evidence in favour of the Kuznets hypothesis over 21 Sub-Saharan African countries during the period 1984-2014. However, the results show that institutional quality moderates the effect of urbanisation on income inequality in the long run.

Wang *et al* [18] follow the same approach to examine the role of urbanisation in reducing income inequality. They use both static and dynamic threshold effect approaches on panel data from 78 countries. In these approaches, income inequality is the explanatory variable, urbanisation and industrialisation are the threshold variables, while energy efficiency is the explained variable. The results show that there is a positive coefficient between income inequality and energy efficiency, and that the coefficient of this positive relationship decreases when the level of urbanisation exceeds the two thresholds of 42.68% and 93.16% respectively, as well as when the level of industrialisation exceeds 12.76% and 19.12%. Furthermore, urbanisation plays a more important role than industrialisation in reducing the correlation between income inequality and energy efficiency. Consequently, accelerating industrialisation, particularly urbanisation, can be used to reduce income inequality without sacrificing energy efficiency. An overview of the literature reveals a contrast as to the real effect of urbanisation on income inequality. The Kuznet curve, which calls into question the linear nature of this relationship, is not always verified, at least in the African data, giving rise to the search for transmission channels. While institutional quality is favoured in most studies, the fact remains that economic growth can play a moderating role in this relationship. This study exploits this channel and contributes to the debate.

3. Methodology

The dynamics of urbanisation favour the emergence of challenges and opportunities linked to inequalities [3]. In order to examine these dynamics, we opt for dynamic panel models. Given the existence of unobserved heterogeneity and simultaneity, the Within estimator leads to unsatisfactory and biased estimates, especially as the time dimension is small relative to the individual dimension [19]. In this context, the generalized method of moments in first difference estimator, which eliminates unobserved individual specific effects, should lead to more satisfactory results. However, this estimator has weak properties in finite samples. In particular, Kiviet [20] and Blundell and Bond [21] show that the first difference estimator can be severely biased, based on Monte-Carlo simulations[2].. The potential existence of a non-negligible bias in the first-difference estimates in our study thus led us to favour the System Generalized Method of Moments (SYSGMM) estimator. In the case of highly persistent series, Arellano and Bover [22] and Blundell and Bond [21] show that it is preferable to use a System Generalized Method of Moments (SYSGMM) estimator. This involves combining the first difference estimator with additional conditions on the level equations[3]..

For the moment conditions to be satisfied, there must be no serial correlation in the idiosyncratic errors. Rejecting the null hypothesis of no serial correlation at order one in the first differentiated errors does not mean that the model is misspecified. Rejecting the null hypothesis at higher orders implies that the moment conditions are not valid. Consequently, second-order autocorrelation tests are performed to check the validity of the model. An over-identification test (Sargan/Hansen) of the restrictions is also

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This bias is noticeable when (a) N is finite, T is small, (b) the number of moments is relatively large compared with the individual dimension [2] and (c) the instruments are weak in the sense of Staiger and Stock (1997).

The first condition states that the explanatory variables (with the exception of the lagged first difference dependent variable) in first [3] difference are uncorrelated with the individual effect. The second condition states that the first difference dependent variable is uncorrelated with the individual effect.

performed to ensure the validity of the instrumental variables. On this basis, the empirical model adopted is as follows:

$$Gini_{it} = \alpha_i + \gamma Gini_{it-1} + \beta_1 Urban_{it} + \beta_2 Gdp_{it} + \beta_3 Infl_{it} + \beta_4 Empl_{it} + \mu_{it} \qquad (1)$$

In order to take account of the moderating effect of economic growth, we adopt a model with interaction between urbanisation and growth as follows:

$$Gini_{it} = \alpha_i + \gamma Gini_{it-1} + \beta_1 Urban_{it} + \beta_2 Gdp_{it} + \beta_3 Urban_{it}*Gdp_{it} + \beta_4 Infl_{it} + \beta_5 Empl_{it} + \mu_{it} \qquad (2)$$

Where, Gini, is used as a proxy for income inequality; Urban, urbanisation; GDP, GDP growth rate; Infl, inflation rate; Empl, employment rate.

The phenomenon we are seeking to explain is income inequality, captured by the GINI index. It is derived from the Lorenz curve, which represents the cumulative percentage of income earned by each cumulative share of the population. It varies from zero to one, with zero indicating total equality and one indicating extreme inequality. The Gini coefficient quantifies the average income disparity between all pairs of individuals, by dividing it by the average income.

Our variable of interest here is urbanisation (URBAN). The conventional measure of the degree of urbanisation is based on an arbitrary minimum urban size limit and does not reflect the hierarchy of urban sizes [23]. Two alternative measures have been proposed: the urbanisation scale and the population concentration scale. The first, like the degree of urbanisation, is based on an arbitrary minimum size limit, but it reflects the urban size hierarchy. The population concentration scale measure also reflects the size hierarchy, but takes into account all points of population concentration. Comparisons between 18 States and over time in the United States reveal that the measures are closely linked. Given the link between these different dimensions, we use the percentage of the population living in urban areas, which is the index most commonly used to measure the degree of urbanisation. There are contrasting forecasts of the effect of urbanisation on income inequality.

Economic growth (GDP) is used here as a moderating variable to curb the ambiguous link between urbanisation and income inequality. The relationship between income inequality and economic growth is also the subject of extensive research. The traditional view suggests that in the early stages of development, economic growth is a source of inequality.

Inflation is used as a control variable. High levels of inflation can exacerbate income inequality by eroding the purchasing power of low-income households. If wages do not keep pace with inflation, income inequality can increase as the purchasing power of low-income earners decreases. In the long term, inflation could be expected to have a detrimental effect on income inequality.

The activity rate (Empl) is also used to control the effect of urbanisation on income inequality. According to INSEE, the activity rate is the ratio between the number of people in work and the total corresponding population. Autor and Dorn [24] have shown that the main factors leading to income inequality in America are the increase in the less technical capacity of work in the service industry and the unequal supply of labour on the American market. For *Doerr et al.* [25], income inequality is at the root of weak business creation. There is therefore an inverse relationship between the activity rate and the level of inequality.

4. Data

This study covers a sample of 33 sub-Saharan African countries over the period 2006 to 2022. The data comes mainly from the World Bank database for the year 2023.

Table 1 summarises the study variables. On average, Africa is becoming more urbanised. However, disparities remain in the sample studied. Although the dispersion around the mean is low (standard deviation 18.71), the series remains very wide. In fact, we are moving from countries with a low level of urbanisation (15.7% of the population) to countries with a high level of urbanisation (90.7% of the population).

Table 1.
Descriptive statistics.

Variables	Obs.	Mean	Std. dev.	Min.	Max.
GINI	561	47.05183	7.251127	32.7	66
INFL	561	13.6841	25.6971	4.054419	54.886
GDP	561	1.687976	4.334599	-36.7777	19.93898
EMPL	561	47.78426	16.97467	15.565	83.319
URBAN	561	41.99617	18.70527	15.144	90.735

African countries are unequal on average. Others are even more unequal (32.7 as a GINI value). Increasingly, the working-age population is becoming an important part of the workforce in African countries. Economic activity grows slowly on average, although there are extreme cases of double-digit growth.
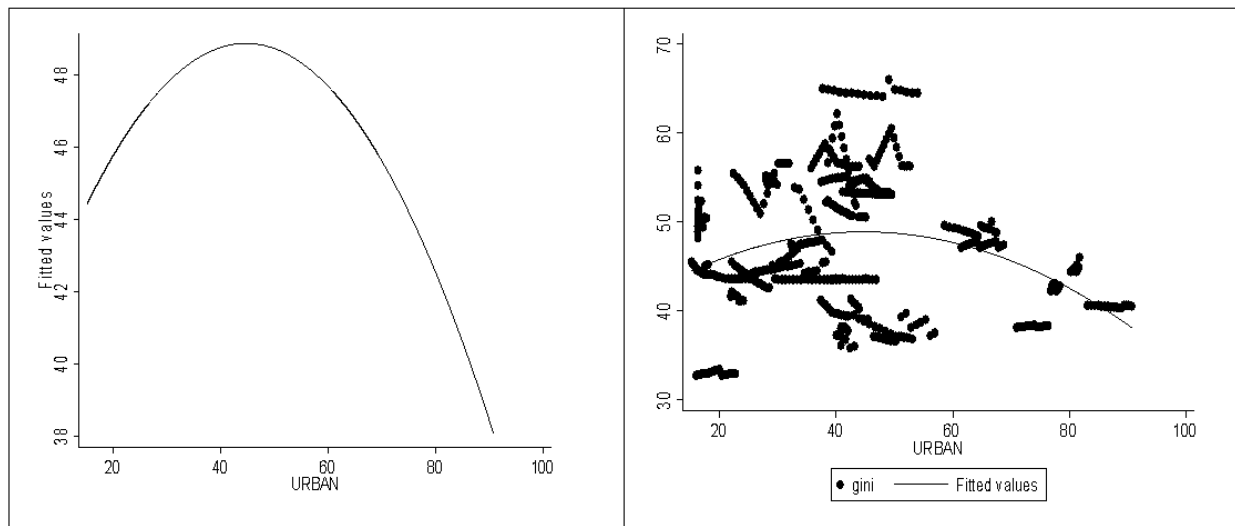
5. Results and Discussion

We begin our examination of the results with a bivariate approach to test the Kuznets hypothesis in our data. Figure (1) shows that the relationship between urbanisation and income inequality is non-linear. This relationship is inverted U-shaped, confirming Kuznzts' theoretical predictions.

For a more detailed study, we estimate equations (1&2) using the generalised method of moments. The results are shown in Table 2. The first column provides information on the direct effect of urbanisation on income inequality. An interaction is introduced into the equation to examine the moderating effect of economic growth. The last column of the table takes into account control variables. Taking urbanisation and economic growth separately, it appears that urbanisation exacerbates income inequality, as in Sulemana et al[6]. However, economic growth reduces income inequality. In the last two columns, the results indicate that economic growth and urbanisation increase income inequality in Sub-Saharan Africa. However, their interaction reduces income inequality. This result implies that urbanisation should create more wealth in order to reverse the inequality curve.

This result seems to be in line with goal 11 of sustainable development. On the basis of the arguments provided by Bertinelli and Black [2], urbanisation has several effects on economic growth. Firstly, cities play an important role in the structure of the economy and society of both developed and developing countries by offering people the opportunity to benefit from education, employment and good health. Secondly, urbanisation involves the agglomeration of people and businesses and reduces production costs. Thirdly, the concentration of people and businesses in cities facilitates access to finance, the promotion of business ideas and the existence of a larger local market. All these factors improve people's opportunities, thereby reducing income inequalities.

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Figure 1.
Non-linear relationship between urbanisation and income inequality.

Thirdly, the concentration of people and businesses in cities facilitates access to finance, the promotion of business ideas and the existence of a larger local market. All these factors improve people's opportunities, thereby reducing income inequalities.

Table 2.
Estimation results.

Variable	(1)	(2)	(3)
L.GINI	0.999*** (0.000)	0.998*** (0.000)	1.026*** (0.000)
GDP	-0.022*** (0.000)	0.009 (0.234)	0.026** (0.013)
URBAN	0.0009*** (0.000)	0.001*** (0.000)	0.007*** (0.000)
GDP*URBAN	-	-0.0007*** (0.001)	-0.001*** (0.000)
INFL	-	-	0.010*** (0.000)
EMPL	-	-	0.0008*** (0.001)
CONS	-0.030 (0.679)	-0.008 (0.949)	-2.218*** (0.000)
AR(1)	-1.96** (0.015)	-1.86* (0.063)	-2.21*** (0.000)
AR(2)	-1.53 (0.279)	-1.09 (0.125)	-1.04 (0.297)
Hansen J_stat	36.75 (0.216)	34.74 (0.213)	29.48 (0.338)
OBS	512	512	512

Inflation exacerbates income inequality. Inflation affects income inequality by eroding the purchasing power of low-income households. If wages do not keep pace with inflation, income inequality

can increase as the purchasing power of low-income earners decreases. *Zheng et al.*[26] provide another explanation for the effects of inflation. Inflation affects income inequality by altering the 'relative weight' of wealth and skill heterogeneity, governed by the ratio of interest income to labour income. More specifically, the impact of inflation on the ratio can be broken down into three channels. Firstly, a higher rate of inflation reduces the rate of economic growth and the equilibrium real interest rate, thereby lowering the rate of return on wealth. This effect on interest rates leads to a fall in the ratio of interest income to labour income. Secondly, by reducing the rate of creative destruction, inflation increases the market value of monopolistic enterprises. This asset value effect increases the value of financial assets held by households and tends to increase the ratio. Third, the suppression of R&D spending due to inflation leads to a fall in the demand for liquidity and in the value of household bonds. This effect on the value of bonds tends to reduce the ratio of interest income to labour income. Combining these effects, we obtain an overall positive effect of inflation on the ratio of interest income to labour income for a wide range of plausible parameters. Therefore, when wealth heterogeneity dominates skill heterogeneity, higher inflation exacerbates income inequality because it increases the contribution/weight of wealth heterogeneity relative to skill heterogeneity.

The participation rate increases income inequality. Theoretical considerations consistent with the incentive hypothesis postulate that wage dispersion is the price to be paid for higher investment, growth rates and employment opportunities. Mirrlees [27] argues that greater dispersion provides greater incentives to work harder, invest more and take risks in order to benefit from high rates of return.

6. Conclusion

African countries have become highly urbanised in recent years, making urbanisation a major challenge. In this context, we set ourselves the objective of analysing the role of economic growth in the relationship between urbanisation and income inequality in Sub-Saharan Africa. To achieve this objective, the generalised method of moments is applied to a sample of *33* Sub-Saharan African countries. The results indicate that economic growth mitigates the exacerbating effect of urbanisation on income inequality. On the other hand, inflation and the activity rate are sources of income inequality. In terms of involvement, the authorities need to strengthen their strategies for cleaning up urban areas. Smart city strategies can also be adopted to make cities more inclusive.

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