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Inequalities in Africa : Does financial integration matter?

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Abstract

This paper assesses the impact of financial integration on inequality in Africa. Two dimensions of financial integration (regional and international) and three dimensions of inequality (economic, environmental, housing) are considered. Using a sample of 26 countries, we estimate a panel data model using the System Generalized Method of Moments (S-GMM) over the period 1985-2016. Our results show that regardless of the dimension considered, financial integration increases economic, environmental and housing inequalities. The results also show that there is a threshold at which financial integration reduces inequality. Financial integration combined with high financial inclusion is necessary for the mitigation of inequality.

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1. Introduction

Financial Integration (FI) continues to emerge as a global necessity that does not leave Africa indifferent, and fuels abundant literature. According to Lane and Milesi-Ferretti (2017), the level of International Financial Integration (IFI) in Africa increased from 1.018 in 1985 to over 3.896 in 2017. During the same period, financial regionalization efforts supported by the African Union Commission (AUC) and the African Development Bank (AfDB) are on the rise. Specifically, the African banking sector has grown rapidly, driven by banks of African origin. In 2017, over 16 banks of African origin were present in at least ten or more countries. The major Pan-African actors that have grown significantly from 1990 to 2017 are: Standard Bank (South Africa), Ecobank (Togo), and United Bank of Africa (Nigeria). This banking expansion has significantly boosted the pace of Regional Financial Integration (RFI), particularly because most of these banks are members of conglomerates that have activities in sectors other than banking (Ekpo and Chuku, 2017). The high growth in the level of financial globalization, coupled with the proliferation of Pan-African banks, dominates the continent's financial system. However, this financial upturn is occurring at the same time as multiple forms of inequality are increasing. While income inequality has dominated analysis, an acceleration of multidimensional inequalities is being witnessed because of a poorly inclusive and inappropriate infrastructural transformation. However, this puts pressure on both housing problems and living conditions. These inequalities are clearly visible in the development's extent of slums or insalubrious neighborhoods, noise, and olfactory pollution.

The configuration of inequalities in Africa is complex. Seven of the ten most unequal countries in the world are in Africa, mainly in Southern Africa. Indeed, Sub-Saharan Africa has 199.5 million people, or 80 percent of the urban population living in slum areas of major cities (UN-Habitat, 2018). The percentage of the urban population living in slums in Mozambique increased from 75.6% in 1990 to 80% in 2007, from 66.4% to 67.7% in Malawi, and from 4% to 17.9% in Zimbabwe (UN-Habitat, 2018). Income inequality reinforced this housing inequality. The Gini index in 2010 was 0.529 in Africa, compared to 0.509 for cities in Latin America and the Caribbean, and 0.305 for the European area (Standardized World Income Inequality Database, 2019). Furthermore, Africa produces 62 million tons of urban waste per year, an average of 0.65 tons per person per day (UN Environment, 2018). The production of household waste is expected to reach 442 million tons per year in 2025. This is because of poorly controlled urban population growth. The African Union (2015) stresses that the realization of the continent's strategic economic development plan depends on reducing inequalities, which remain a genuine threat to Agenda 2063. The United Nations Development Programme (UNDP, 2017), in the context of the Sustainable Development Goals (SDGs) adopted by the United Nations in 2015, notes an acceleration of income inequalities in Sub-Saharan Africa between 1991 and 2011. Africa remains the most unequal region in the world.

Global financial liberalization dates back to the early 1970s with the pioneering studies of McKinnon (1973) and Shaw (1973). The research mainly includes two dimensions: the deregulation of domestic financial sector and the account capital opening (Batuo and Asongu, 2015). Thus, this refers to a diminished role of Government and an increased role of international capital (Abiad *et al.,* 2008). The resurgence of income inequalities is associated with dramatic changes in countries' net external financial positions. Although the growth of cross-border capital holdings in terms of global GDP has slowed considerably, the levels still remain very high. Implicit in these findings is the question of the link between the process of financial openness and income inequality.

The literature on inequality considers three orientations: first is the construction of indicators (Atkinson, 1997); second are the effects of inequalities on economic and mesoeconomic variables (Lachaud, 2006); and, third, the determinants of inequalities. Thus, the literature distinguishes three types of determinants. First are socio-economic determinants such as population density, natural resources, education, household size, aid, government spending, and investments (Fosu, 2018; Saidon *et al.,* 2013). Second are institutional determinants such as democracy, governance, colonial origin, and ethno-linguistic fragmentation which play a major role in shaping inequality (Bigstein, 2018). Third are financial determinants including financial capital, whose level varies according to the degree of financial liberalization, level of globalization, and the extent of financial crises (Ni and Liu, 2019; De Haan *et al.,* 2017).

The consolidation of theoretical milestones to distinguish the nature, consequences, and causes of inequalities has favored the emergence of two approaches. The optimistic approach (less explored) and the pessimistic approach emphasize that inequality give rise to disparities and poverty. Financial integration matters to the processes of economic growth and development. Its induced effects are fairly well documented and more or less consensual in the literature (Erauskin and Turnovsky, 2019). Financial integration is a means of channeling financial resources over time and across borders, contributing to some extent to risk mitigation (Merton and

Bodie, 1995). It reduces financial frictions, transaction costs, and information asymmetries (Allen and Santoméro, 1997). Also, it improves efficiency in capital allocation, savings mobilization, uncertainty management, and transaction facilitation (Seven and Coskun, 2016). Although financial liberalization has laid the foundation for financial market integration, income inequality appears to be increasing. However, the reduced costs of investing and borrowing abroad made easy by financial integration favor capital owners and thus increase inequalities (Erauskin and Turnovski, 2019).

Following this theoretical framework and drawing on empirical methodologies widely documented in the literature, the aim of this paper, which is its originality, is to examine the impact of financial integration on three dimensions of inequalities in Africa. To this end, a sample of 26 African countries was considered over the period 1985-2016, and the System Generalized Method of Moments (S-GMM) was also applied. Overall, the results show that RFI and IFI increase economic, environmental, and housing inequalities in Africa. Moreover, there are thresholds at which RFI and IFI reduce inequalities. To this end, and more specifically, the study contributes to the literature on the subject in three ways. First, it incorporates the two levels of financial integration, namely RFI and IFI, as relevant indicators of the multidimensional inequalities observed in Africa. This is in contrast to studies that have focused solely on the international aspect of financial integration. Thus, the disaggregated indices better illustrate their relevance to inequality. Second, it complements and enriches empirically literature by considering income, housing, and environmental inequalities. In all likelihood, there are no studies on the subject, yet Africa should be a privileged territory because of its strong demographic growth and the vulnerabilities it continues to face. Finally, it shows its polysemic nature, which can be understood by considering disaggregated indices in order to make relevant recommendations.

The rest of the article is structured as follows: The second section identifies some stylized facts, the third presents a synthesis literature review, and the fourth outlines the empirical strategy adopted. The fifth discusses the results. The sixth section concludes and suggests some policy recommendations.

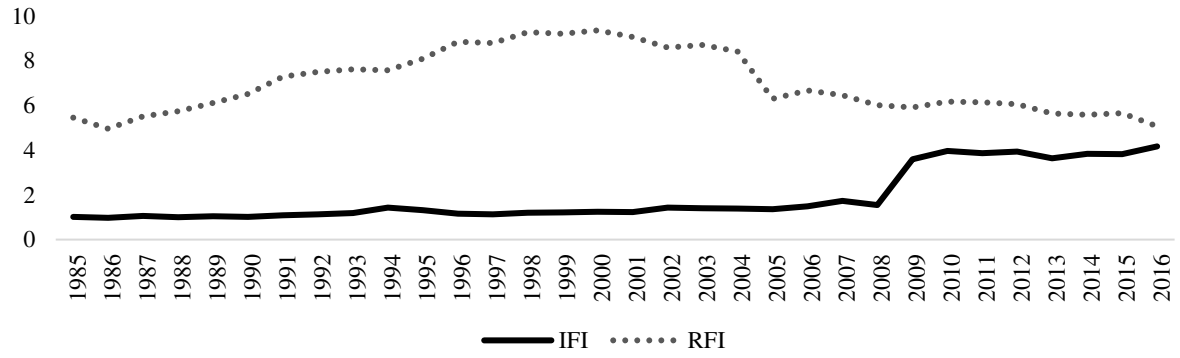
2. Some Stylized Facts

Two stylized facts emerge from the observations of financial integration and inequalities in Africa.

❖ Financial integration improves in Africa

Figure 1 shows that the RFI index has been decreasing since 2001. This shows an improvement in regional financial integration. The same is true for the level of international financial integration, which has been steadily increasing in Africa over the period 1985-2016. The consolidation of banking activities across the continent and the many transactions related to FDI and portfolio investments seem to reinforce the idea that Africa is becoming financially integrated.

Figure 1. Evolution of RFI and IFI in Africa (1985-2016)

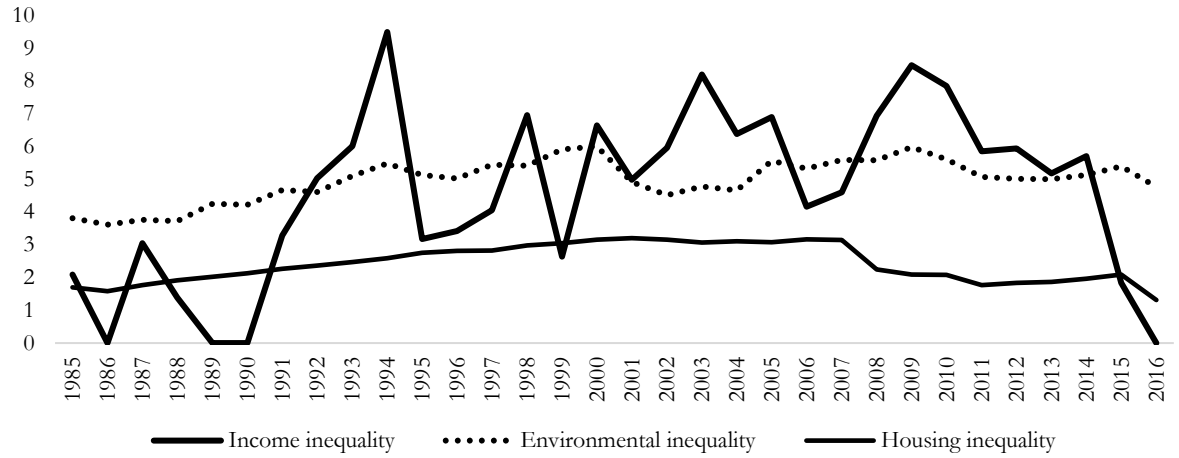


Source: Authors from IMF international financial statistics (2018).

❖ Inequalities persist in Africa

Figure 2 shows a saw tooth pattern of inequalities in income, environmental aspect, and housing. However, inequalities in Africa appear to be decreasing, yet they persist. Since 2000, when the Millennium Development Goals (MDGs) were implemented, the fight against inequalities has never been more prominent. Developing countries, particularly those in Africa, have been working to reduce inequalities despite the difficulties associated with the quality of institutions.

Figure 2. Evolution of inequalities in Africa (1985-2016)



Source : Authors from SWIID (2018), UN-Habitat (2018), UN-Environment (2018).

These two graphs show that financial integration has improved over the period 1995-2016, while inequalities has continued to increase over the same period. Thus, there would be a negative correlation between financial integration and inequalities.

3. Literature Review

This section summarizes the theory and empirical evidences on the effects of financial integration on inequalities.

3.1. Financial Integration and Inequalities: A Theoretical Deduction

At the outset, it is important to understand the concepts of financial deregulation and capital account openness. Financial deregulation is a process undertaken by public authorities to change the financial sector in favor of competition by removing regulations in order to improve the efficiency of financial markets and intermediaries, thereby facilitating the financing of the national economy. The capital account openness refers to the removal of restrictions on the movement of capital flows into and out of the economy. The combination of these two concepts leads to globalization. Theoretical perspectives on the link between financial integration and inequalities can be divided into two distinct viewpoints. They are pro-globalization theorists who argue that globalization is associated with the reduction of inequalities through economic growth and anti-globalization theorists who conclude that inequalities are rising with globalization. Following the seminal work of Kuznets (1955) who established an inverted U-shaped path of income inequality during economic development, three hypotheses have emerged. First is the inverted-U hypothesis through the contribution of Greenwood and Jovanovic (1990) who developed a theoretical model predicting an inverted-U-shaped relationship between financial development, income inequality, and economic development. Second are the narrowing inequality hypothesis with Banerjee and Newman (1993) and Galor and Zeira (1993) who highlighted that financial development leads to a reduction in income inequality as the poor gain more access to financial services. Finally, it entails the widening inequality hypothesis with Gregorio (1996) who laid the groundwork for an endogenous life-cycle model where individuals face borrowing constraints.

However, the Stolper-Samuelson theorem[1] predicts that global integration increases income inequality in developed countries and decreases inequality within developing countries. Several theoretical contributions have shown flaws in the Stolper-Samuelson assumptions and have identified various potential channels and implications of how globalization shapes income inequality. For example, the ‘race to the bottom’ theory (Sinn, 2003) argues that the pressure of globalization on tax rates and regulations contributes to lower public spending and less redistribution. From this perspective, globalization is expected to increase income inequality after taxes and transfers. Authors emphasizing the ‘dark side of globalization’, such as Stiglitz (2004), argue that globalization is responsible for redistributive activities and the reduction of social security systems. Demirguc-Kunt and Levine (2009) found that improved financial markets, contracts, and intermediaries appear to be beneficial in expanding economic opportunities and reducing inequality at the same time. Certainly, financial integration by improving the efficiency of capital allocation, through the reduction of credit constraints, contributes to the reduction of income inequality (Thornton and Tommaso, 2020). The literature suggests various

[1]This theorem originates from the work of Stolper and Samuelson (1941).

mechanisms through which financial integration can affect income inequality with different implications for growth, investment, and productivity. In the neo-classical framework, all effects are generated by capital flows. In the standard model, the opening of international capital markets generates abundant capital flows to countries, thus speeding up divergence in poor countries (Bonfiglioli, 2008).

3.2. Financial Integration and Inequalities: An Empirical Synthesis

The empirical evidence evaluating the theoretical positions is non-consensual because of the measures of globalization and income inequality, the sample of countries, and the estimation technique. The effects of financial integration on income inequality have been assessed in both multi-country and single-country investigations. However, Stiglitz (2013) found that financial integration disproportionately benefits the poor and increases income inequality. However, three levels emerge from the empirical literature. The first, which emphasizes linear effects, highlights that more (less) financial integration tends to be associated with less (more) income inequality. Thus, the linear effects of financial integration on income inequality are non-consensual. Financial integration can increase (Beck et al., 2000) or reduce income inequality (Bumann & Lensink, 2016). A second level highlights non-linear effects of financial integration on income inequality illustrated through a U-shaped and an inverted U-shaped relationship (Law *et al.,* 2014). A third level highlights mixed effects of financial integration on income inequality (Rodrik, 1998; Stiglitz, 2000).

Adams (2008) found that the IF increased inequality, and did not reduce the income gap. Bergh and Nilsson (2010), in a sample of 79 countries over the period 1970-2005, showed that the IFI measured by the freedom to trade internationally (trade taxes, tariffs, trade barriers, and controls) increases inequality. Florian et al. (2017) using panel data in a sample of developed and developing countries found that the IFI increased income inequality. Parc (2017) and Bumann and Lensink (2016) have shown that the IFI (as measured by financial depth through the liberalization of capital accounts) reduces income inequality. Erauskin and Turnovsky (2019) using simulations in a sample of 96 developed and developing countries over the period 1970-2015 find that the IFI increases income inequality. Ifeakachukwu (2020) using econometric techniques based on a vector error correction model found that the IFI increased income inequality in Nigeria over the period 1981-2018.

Jaumotte *et al.* (2013) pointed out that trade liberalization (measured by the ratio of exports and imports to GDP) is associated with reduced income inequality, while globalization (measured by the ratio of cross-border assets and liabilities to GDP) and foreign direct investment (measured by inward foreign direct investment), on the other hand, are associated with more inequality. They also found technological progress to be an important force driving inequality. Furthermore, Inekwe *et al.* (2018) found that FI increases net income inequality while it reduces market income inequality.

4. The Empirical Strategy

It presents the model, justifies the estimation technique, and underlines the data sources.

4.1. The Empirical Model

The empirical model is inspired by the work of Inekwe *et al.* (2018) and Erauskin and Turnovski (2019) who link financial integration to income inequality. The model specification is given by the equation (1) below.

$$Inequalities_{it} = \beta + \alpha Inequalities_{it-1} + \pi IF_{it} + \gamma X_{it} + t_i + \delta_t + \varepsilon_{it} \qquad (1)$$

Here, Inequalities represents the index of inequalities of country *i* at time *t.* Contrary to previous studies, there are captured by three measures: (i) Income inequality describe the income gap between the affluent who can afford better living conditions and those living below the monetary poverty line (Mahmmod and Noor, 2014). Thus, the Gini coefficient was employed; (ii) Housing inequality describes disparities in access to the type of housing and characterization of occupied housing (Kanbur and Zhuang, 2013). Recently, according to UN Habitat (2018) and Aizawa *et al.* (2020), housing inequality refers to inadequate housing where the inhabitants suffer one or more of the following household deprivation criteria: lack of access to an improved water source, lack of access to improved sanitation facilities, lack of sufficient living area, lack of housing durability, and lack of security of tenure. They measure housing inequality by the rate of population living in inadequate housing over the total population; (iii) Environmental inequality is of particular interest in development studies because their unrationalised management causes further inequalities. Environmental inequalities describe socio-ecological and socio-environmental disparities in access to the life quality, exposure to olfactory nuisances, and risks (Durand and Jaglin, 2012). These inequalities reflect poor waste management. They are measured by the percentage of

the population who live in neighborhoods where waste is not collected and treated on the rate of the total population of the city (Durand, 2012). They are the subject of renewed interest in development studies because their lack of rationalized management leads to other inequalities; $Inequalities_{it-1}$ is the index of inequalities lagged by one period, while IF_{it} is the matrix of interest variables that describe the RFI (difference between a country's interest rate spreads of credit market and those of a regional average[2]) and the IFI (sum of external assets and liabilities as a percentage of GDP). These are quantity-based measures that seek to quantify the amount of capital flows between economies (Bonfiglioli, 2008; Erauskin and Turnovski, 2019). *ti* captures the unobserved country-specific effects, δt takes into account the time-specific effect common to all countries, and ε_{it} is the error term.

X_{it} is the matrix of other explanatory variables composed of: (i) real GDP per capita, which captures the standard of living of the population; (ii) domestic investment which is approximated by Gross Fixed Capital Formation as a percentage of GDP (GFCF); (iii) the unemployment rate is measured by the number of unemployed persons aged 15-34 years, as a proportion of the total number of this population group. This unemployment rate contributes to increasing inequality; (iv) the democracy index is measured by the way representatives are appointed; (v) financial development is measured by domestic credit to the private sector as a percentage of GDP (Credit); (vi) the human development index (HCI) is measured by the average number of years of education per worker.

4.2. Estimation Technique

The panel Ordinary Least Squares (OLS) estimator was first retained in order to perceive the weight of different relationships put forward in equation (1). However, potential endogeneity problems are not addressed by this method. In order to take advantage of panel data and to solve potential endogeneity problems, the Generalized Method of Moments (GMM), whose First Difference Generalized Method of Moments (FD-GMM) estimator was introduced by Arellano and Bond (1991) and Arellano and Bover (1995), was resorted to. Subsequently, Blundell and Bond (1998) improved the FD-GMM estimator by developing the System Generalized Method of Moments (S-GMM) estimator, which is more appropriate for solving endogeneity problems. The advantage of S-GMM modeling lies because it allows the endogeneity of the explanatory variables of interest and the other explanatory variables to be corrected. While S-GMM seems in theory more efficient than FD-GMM, it uses more instruments than the latter which makes it particularly inappropriate when the individual dimension is small. Thus, this method was used because it is expected that there exists an endogenous relationship between explanatory variables and inequality measures. To solve this problem, instruments are introduced. As instruments, the first differences of the explanatory variables were used by their values lagged by at least one period in level. As for their level values, they are instrumented by the most recent first difference values[3]. Also, the tests of model over-identification (Hansen test), error autocorrelation (AR1 and AR2), and the Windmeijer (2005) correction were performed to validate the results of our specifications.

4.3. Data

The study covers 26 African countries (see Appendix Table A.I). The time horizon covers the period 1985-2016. However, for methodological reasons, the study period is divided into four to obtain nine sub-periods. The choice of period is dictated by the availability of data obtained simultaneously from the countries in the sample. The data are drawn from several sources. Data on macroeconomic variables are from the World Bank Database (2019) and Penn World Table 9.1. Inequality-specific data are taken from the Standardized World Income Inequality Database (SWIID) and UN-Habitat (2018). Data on institutional variables are from Polity IV Project Online (2019). The RFI measure is by Ekpo and Chuku (2017) whose data are gotten from IMF International Financial Statistics[4]. The data on IFI is from the External Wealth of Nations mark II database by Lane and Milesi-Ferretti (2007) and its update. The descriptive statistics contained (see Appendix Table A.II) show overall little fluctuation between variables. However, the correlations between the different variables used are not high enough to create serious problems of multicollinearity (see Appendix Table A.III).

5. Results and Discussion

The results of the basic model and of the robustness analysis were presented.

[2]A decrease in this difference implies an increase in regional financial integration (Ekpo and Chuku, 2017).

[3]See (Roodman 2009).

[4]For more details on the construction of this variable, see Ekpo and Chuku (2017).

5.1. Basic Regression Results

Despite concerns about potential endogeneity problems, some interesting elements emerge from the OLS results. Indeed, the coefficients of the RFI are negative and significant in the specification with income inequality as the dependent variable, although not significant for housing inequality. Moreover, in the specification with environmental inequality as the dependent variable, the RFI coefficient is positive and significant. Furthermore, the coefficients of the IFI are systematically positive and insignificant in the specifications with income and environmental inequality as dependent variables. These particular results will not necessarily hold in the more robust system GMM regressions.

The results of the S-GMM regressions were presented according to the two aspects of financial integration and for each measure of inequalities (income, environmental, and housing). Overall, the results show a memory effect. Recorded income inequality is negatively influenced by the level of previous income inequality, which is the opposite of housing and environmental inequalities. The regional financial integration variable is negative and is significantly related to all three selected inequality measures. This result proves that an increase in regional financial integration, represented by a reduction in RFI, is associated with higher levels of income, environmental, and housing inequalities. However, since the statistical and economic significance do not coincide, it is important to check the economic and quantitative extent of the amplifying effect of RFI on the inequality measures by multiplying the coefficient of RFI, 0.0000312, 0.00011 and 0.00000857 by its standard deviation[5], 7167 (see Appendix Table A.II). Thus, this results to 0.22, 0.79, and 0.061 for the three inequality measures. In more practical terms, this result implies that a one standard deviation decrease in the RFI will lead on average to an increase in income, environment, and housing inequalities of 0.22, 0.79 and 0.061 point respectively.

The results for the international financial integration variable show a negative relationship with the selected inequality measures. The measure of international financial integration has a negative and significant coefficient of the order of 0.0555, 0.531, and 0.0118 in the three specifications incorporating the inequality measures. Two arguments can justify these results. First, the lower cost of credit generated by a liberalized market will be favorable to bank account holders and investors, who will be able to make capital investments, increase their income, and acquire more real estate (Inekwe *et al.,* 2018; Erauskin and Turnovski, 2019). This situation pushes the owners of capital to grab viable and developed land at the expense of those excluded from the conventional financial system, and to invest in production activities that degrade the environment (Arestis and Caner, 2009). Second, the capital inflows generated by the IFR and IFI favors the development of industrial production zones in which there are strong inequalities due to wage disparities. These zones stress the phenomenon of rural exodus, which increases impoverishment with consequences for the environment and housing (Gereffi, 2009).

The consideration of regional financial integration complements the results obtained by Erauskin and Turnovski (2019). Moreover, the coefficients obtained for the variable RFI are larger than those for IFI. Two arguments can explain this. First, direct investment supported by RFI promotes the development of cross-border credit activity while discouraging financial inclusion, which increases income and housing disparities with effects on environmental quality. Second, the RFI creates some exclusion in the bank credit market as only actors with a special status and a large portfolio of assets can benefit from it. In sum, the RFI explains inequality better, in so far as it directly affects credit conditions and de facto the income of populations, while admitting that the two other forms of inequality retained in this paper are intrinsically linked to income inequality. This result is particularly interesting in the light of two facts. The first fact is related to the situation of the countries of the two African monetary unions, namely; WAMU[6] and CAMU[7]. Indeed, both unions are characterized by a high level of RFI, but inequality seems to be more important in CAMU than in WAMU. Countries such as the Republic of Congo and Chad have higher levels of income, environmental, and housing inequality than Senegal and Togo, for example. Second, Mauritius and South Africa, which are among the most financially developed, also have mixed fortunes. South Africa is more unequal than Mauritius despite its high level of financial integration.

Results for variables measuring GDP per capita, investment (Gross Fixed Capital Formation/GDP) and financial development (domestic credit to the private sector/GDP) show that they take on the expected economic signs. This is because all three are negatively related to inequality measures. This implies that GDP per capita, domestic capital investment, and credit to the economy are important for reducing inequality in Africa. As for the control

[5]De Nicolo and Juvenal (2014) and Ekpo and Chuku (2017) have used this procedure.
[6]West African Monetary Union.
[7]Central African Monetary Union.

variables, the results show that the human development index reduces income inequality, while unemployment amplifies environmental inequality as does democracy with income inequality.

A close examination of the model diagnostic test for over-identifying restrictions and instrument validity (i.e., Hansen test) indicates the null hypothesis of no correlation between instruments and residuals in all regression specifications cannot be rejected in Table I. This conclusion follows from the p-values associated with the Hansen test statistic. Furthermore, the test for second-order autocorrelation in the residuals shows that there is no second-order serial autocorrelation in the residuals, which justifies not including more lags in the dependent variable in the right-hand side.

Table I. Empirical impact of financial integration on inequalities in Africa

	Income inequality		***Environmental inequality***		***Housing inequality***	
	OLS	***S-GMM***	***OLS***	***S-GMM***	***OLS***	***S-GMM***
Income inequality(t-1)		*-0.464****				
		(0.045)				
Environmental inequality(t-1)				*0.345**		
				(0.185)		
Housing inequality(t-1)						*0.864****
						(0.0514)
RFI	*-0.023**	*-0.0000312****	*0.0312****	*-0.00011****	*-0.008*	*-0.00000857****
	(0.0119)	*(0.00857)*	*0.0118*	*(0.00374)*	*0,022*	*(0.00174)*
IFI	*0.0255*	*0.0555**	*0.00377*	*0.531****	*-0.122****	*0.0118****
	(0.0828)	*(0.029)*	*(0.0215)*	*(0.125)*	*(0.0150)*	*(0.0365)*
GDP per capita	*-0.0313*	*0.0643*	*-0.0211*	*-0.389****	*-0.00127*	*-0.0322****
	(0.0424)	*(0.0419)*	*(0.0294)*	*(0.11)*	*(0.0340)*	*(0.0496)*
Investment	*-2.198*	*0.0184*	*-4.731****	*-0.308***	*10.67****	*-0.0544*
	(2.163)	*(0.0256)*	*(1.077)*	*(0.14)*	*(1.191)*	*(0.0064)*
Credit	*-0.00441*	*-5.263***	*-0.601****	*-3.59****	*-0.126****	*-1.307****
	(0.0612)	*(2.401)*	*(0.0202)*	*(11.93)*	*(0.0319)*	*(0.398)*
HCI	*-1.128*	*-1.914**	*1.339***	*2.035*	*-2.231****	*0.0483*
	(1.387)	*(1.084)*	*(0.596)*	*(5.49)*	*(0.312)*	*(0.193)*
Unemployment	*0.00315*	*0.142*	*0.224****	*2.128***	*0.0234*	*0.0222*
	(0.0889)	*(0.136)*	*(0.0421)*	*(0.785)*	*(0.0260)*	*(0.0148)*
Democracy	*0.100*	*0.275****	*-0.158****	*-0.321*	*0.0250*	*0.0105*
	(0.116)	*(0.0953)*	*(0.0488)*	*(0.252)*	*(0.0433)*	*(0.0147)*
Constant	*8.076****	*8.533****	*3.571****	*-4.298*	*6.555****	*0.362*
	(2.790)	*(2.471)*	*(1.068)*	*(9.005)*	*(1.181)*	*(0.52)*
Observations	*651*	*202*	*651*	*202*	*651*	*202*
R^2	*0.256*		*0.312*		*0.4125*	
Countries	*26*	*26*	*26*	*26*	*26*	*26*
Instruments		*25*		*13*		*23*
AR(1)		*0.0458*		*0.015*		*0.0145*
AR(2)		*0.46*		*0.138*		*0.334*
Hansen test		*0.218*		*0.314*		*0.433*

Notes: *, **, and *** significance at 10%, 5%, and 1% respectively. Standard deviations robust to heteroscedasticity are in brackets.

Source: Authors.

5.2. Robustness Analysis

Table II establishes a U-shaped relationship between the RFI, the IFI and inequality to show that over the entire period studied, the effect is not linear. Thus, there is a regime where RFI and IFI reduce inequality and another where RFI and IFI increase inequality. The results show the existence of a U-shaped relationship between the RFI and income, environmental, and housing inequalities. Indeed, a decrease of one standard deviation of the RFI will lead on average to a decrease in income, environmental, and housing inequalities of 5.52, 1.61 and 0.61 points respectively. This continues until a certain point where the decrease of the standard deviation of the RFI (RFI2) will lead, on average, to a gradual increase in income, environmental, and housing inequalities of 0.0867, 1.16 and 0.0767 points respectively[8]. As for the IFI variable, the results suggest an inverted U-shaped relationship between income inequalities (Erauskin *et al.,* 2019). Indeed, the increase in the IFI leads to an increase in income, environmental, and housing inequalities of 1.44, 0.16 and 0.155 points respectively up to a certain level at which the increase in the IFI (IFI2) leads to a decrease in income, environmental, and housing inequalities of 0.172, 0.0332 and 0.0015 point. The inverted-U relationship between the IFI and income inequality has also been

[8]These results are obtained from the transformation used earlier.

highlighted by Erauskin and Turnovski (2019) with coefficients close to those obtained in this study, namely -0.0025 and -0.0014. These results indicate a presumption of a non-linear impact between RFI, IFI, and inequality. Moreover, they reinforce the results obtained in Table 1. However, Table 2 reconfirms the important role of financial development in reducing inequality.

Table II. S-GMM regressions of quadratic linear impact of RFI, IFI on inequalities

	Income inequality		***Environmental inequality***		***Housing inequality***	
	(1)	***(2)***	***(1)***	***(2)***	***(1)***	***(2)***
Income inequality(t-1)	*-0.381****	*-0.413****				
	(0.177)	*(0.149)*				
Environmental inequality(t-1)			*0.581****	*0.584****		
			(0.234)	*(0.228)*		
Housing inequality(t-1)					*0.834****	*0.764****
					(0.738)	*(0.158)*
RFI	*0.000770****		*0.000225****		*0.0000848***	
	(0.000217)		*(0.0000749)*		*(0.00402)*	
IFI		*1.440****		*0.160****		*0.155***
		(0.308)		*(0.0295)*		*(0.0619)*
RFI^2	*-0.0000121****		*-0.000162***		*-0.0000107***	
	(0.00142)		*(0.00187)*		*(0.00149)*	
IFI^2		*-0.172****		*-0.0332****		*-0.00149**
		(0.0351)		*(0.0322)*		*(0.0764)*
GDP per capita	*0.0607*	*0.0916*	*0.00628*	*0.00364*	*-0.0231****	*-0.0156**
	(0.058)	*(0.0695)*	*(0.00694)*	*(0.0285)*	*(0.00725)*	*(0.0809)*
Investment	*-0.0669**	*-0.0668*	*-0.0403***	*-0.0419**	*-0.0247*	*-0.0465***
	(0.0339)	*(0.0512)*	*(0.0173)*	*(0.0213)*	*(0.0148)*	*(0.02)*
Credit	*-8.435****	*-8.688**	*-4.678****	*-5.831****	*-0.940***	*-2.923****
	(1.922)	*(4.358)*	*(0.718)*	*(0.848)*	*(0.358)*	*(0.797)*
HCI	*-5.672***	*-1.558*	*0.18*	*-0.438*	*-1.135****	*-1.210***
	(2.106)	*(2.989)*	*(0.54)*	*(0.512)*	*(0.189)*	*(0.469)*
Unemployment	*0.816****	*0.561***	*0.247****	*0.323****	*0.175****	*0.311****
	(0.15)	*(0.211)*	*(0.0786)*	*(0.0713)*	*(0.0227)*	*(0.0517)*
Democracy	*0.251**	*0.0756*	*0.0174*	*0.00212*	*0.0298*	*0.0249*
	(0.126)	*(0.2)*	*(0.0334)*	*(0.0327)*	*(0.0214)*	*(0.0248)*
Constant	*10.86****	*4.818*	*1.412*	*2.380***	*1.587****	*1.443*
	(3.705)	*(5.681)*	*(0.946)*	*(1.018)*	*(0.494)*	*(0.95)*
Observations	*202*	*202*	*202*	*202*	*202*	*202*
Countries	*26*	*26*	*26*	*26*	*26*	*26*
Instruments	*25*	*16*	*23*	*23*	*23*	*23*
AR(1)	*0.0365*	*0.0214*	*0.025*	*0.089*	*0.015*	*0.026*
AR(2)	*0.682*	*0.936*	*0.338*	*0.238*	*0.317*	*0.321*
Hansen test	*0.186*	*0.131*	*0.217*	*0.338*	*0.42*	*0.282*

Notes: *, **, and *** significance at 10%, 5%, and 1% respectively. Standard deviations robust to heteroscedasticity are in brackets.

Source: Authors.

6. Conclusion

This paper has analyzed the impact of financial integration on inequality in Africa. Emphasizing on the international and regional financial integration efforts over the last three decades, whose principal beneficiaries are African countries, an unexplored issue was theoretically and empirically studied. Previous studies have always analyzed the role of financial integration on income inequality but on panels of developed countries. The generalized method of moments on panel data was used. Thus, its estimates on a sample of 26 countries over the period 1985-2016 show that regional financial integration and international financial integration increase income, environmental, and housing inequalities. From these results, a consolidation of the financial integration process was recommended. This is coupled with an increase in the level of financial inclusion and regulation through implementing rules considering economic, environmental, and housing disparities.

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APPENDIX

Table A.I. List of countries

Algeria, Angola, Benin, Botswana, Burkina-Faso, Cameroon, Congo republic, Egypt, Gabon, Ghana, Mauritius, Kenya, Lesotho, Mali, Morocco, Mozambique, Namibia, Niger, Nigeria, Central African Republic, Rwanda, Senegal, South Africa, Togo, Tunisia, Zimbabwe.

Table A.II. Summary statistics

	Observations	Mean	SD	Min	Max	Sources
Income inequalities	832	4.564	13.53	0	65.80	SWIID
Environmental inequalities	832	4.965	6.103	0	38.26	UN-Habitat
Housing inequalities	832	2.421	5.865	0	31.50	UN-Habitat
RFI	832	587.6	7167	0.00052	187.911	Ekpo and Chuku (2017)
IFI	832	1.906	7.209	-0.790	79.82	Lane and Milesi-Ferretti (2007)*
HCI	832	1.780	0.473	1.022	3.106	PWT 9.1
GDP per capita	832	3.926	11.06	-115.9	59.08	WDI
Democracy	832	0.407	5.906	-9	10	Polity IV
Credit	832	0.264	0.266	0.0201	1.601	WDI
Unemployment	676	10.02	8.698	0.300	37.97	WDI
Investment	795	21.57	8.530	0	79.46	WDI

*Notes: * Updated in March 2017, SD: Standard-deviation.*

Source: authors

Table A.III. Correlation matrix

	Inc_ine	Env_ine	Hous_ine	RFI	IFI	GDP	Inv	Credit	HCI	Unem	Demo
Inc_ine	1										
Env_ine	0.0062	1									
Hous_ine	-0.0146	-0.1024	1								
RFI	-0.0217	0.0817	-0.0212	1							
IFI	0.0023	-0.0730	-0.0431	-0.007	1						
GDP	-0.0177	-0.0388	-0.0335	-0.030	-0.001	1					
Inv	-0.0070	0.0060	-0.1767	-0.144	0.020	0.0182	1				
Credit	-0.0383	-0.0894	0.3950	-0.034	0.2973	-0.0567	0.0053	1			
HCI	-0.0389	0.1046	-0.032	0.0712	0.178	0.0157	0.1329	0.347	1		
Unem	-0.0281	0.1820	0.1377	-0.046	-0.012	-0.0169	0.2564	0.458	0.4540	1	
Demo	0.0161	-0.1188	0.0919	-0.059	0.196	0.0693	-0.0639	0.2895	0.3199	0.1702	1

Notes: Inc_ine: income inequalities, Env_ine: environmental inequalities, Hous_ine: Housing inequalities, GDP: GDP per capita, Inv: Investment, Unem: Unemployment, Demo: Democracy.

Source: authors