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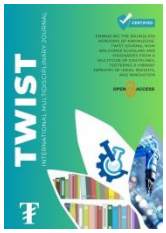

Financial Development and Income Inequality Nexus in Africa:

Does Governance Matter?

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Abstract
The study investigates the role of governance on financial development and inequality nexus in African economies. Based on the system-Generalised Method of Moments (sys-GMM) on 41 African countries from 2001-2020. The empirical findings from the study are: (1) income inequality is highly persistent in the African countries; (2) financial development has insignificant increasing impact on inequality; (3) the interactive terms of financial development with control of corruption and rule of law have increasing impacts on income inequality implying that when there is rule of law and corruption is under controlled, given an increase in financial development will further widen inequality in the region. The study concludes by advocating for the need of good governance before income inequality can be reduced in Africa.

Keywords
Financial development, Governance, Income inequality, Africa

INTRODUCTION

COVID-19 pandemic has made the wealth and fortunes of ten richest men in the world to be more than double from 700 billion USD to 1.5 trillion USD while the incomes of 99 percent of humanity fall as more than new 160 million people entered into poverty trap during the first 2 years of the pandemic (Oxfam report, 2022). This has undoubtedly, worsen the case of inequality as it contributes to the death of at least 21,000 people each day as billionaires' wealth rises at $500 trillion than it has in the last 14 years, as noted in the report. Income inequality which has being persistent and stubbornly high in African countries (Kunawotor, Bokpin, Asuming, & Amoateng, 2020; Asongu, Orim, & Ntig, 2019; Shimeles & Nabassaga, 2018) is one of the areas that has gained prominence in the area of public policy.

The sudden emergence of COVID-19 has however, further widen inequality gap as the wealth of the three richest men in west Africa increased by $6.4 billion within 17 months of the pandemic and this is equivalent to 7 million job lost (Oxfam, 2022). As noted in the report, the wealth of billionaires from West Africa has increased by 38 percent while 90 percent of peoples' wealth at bottom dropped in the year 2020. This recent pandemic has further worsened the already skewed distribution of income. Unequal distribution of income has remained a topical issue as proven by existing data, is a major challenge facing African countries. As a way out, different policy reforms geared towards structural changes have been implemented in the financial sector to improve it and overall growth within 1980s and 1990s (Aron & Elbadawi, 1992). These policy reforms have generally impacted financial sector positively, but mixed on the economy and controversial on income inequality and poverty alleviation.

Despite these reforms, the challenges still remain as majority of population and SMEs still do not have access to finance, and still remain poor, African financial sector is still lagging behind other regions. Notably, each time African countries experienced higher economic growth rate, the history has it that such benefits favor the rich tremendously than the poor. The periods of such increase in the economic growth rate have witnessed higher unequal income distribution which indicate that the dividends of such economic progress do not trickle down to the poor in most African countries. The African continent is just lag behind the Latin America in term of most region with inequality in the world (Klasen, 2016). African countries achieved impressive growth with real gross real domestic product (RGDP) on the average jumps from above 2% within 1980-1990s to above 5% within 2001-2014. Within 2001-2010, 6 out of 10 world rapidly moving economies were found in the region (AEO, 2011; AfDB, 2012). Though, economic activities were constrained in Africa by 2.1% in 2020 because of COVID-19 pandemic, real GDP has been projected to grow by 3.4% (AEO, 2021). Yet,

Africa is still in possession of large numbers of the people living below poverty level characterized by huge income inequality, unemployment, corruption and low life expectancy. This persistence in Africa's inequality has become alarming because 10 out of 19 unequal economies in the World are located in Africa (United Nation Development Programme, 2017).

Attention was also shifted to a good governance, a concept that was first introduced by World Bank report of 1989, towards achieving poverty and inequality reduction and improving standard of living in the society. A good and unbiased governance has dominated discussion of development policy because of its broader notion of attaining sustainable economic growth along with other policy factor such as government policies that strengthen financial sector to allocate scarce resources in such a way that ensure poverty and income inequality reduction. The poor, by its characteristic will lack collateral securities, reliable and consistent credit account and records, and political connections may now have access to finance to commit to both human and physical capital in order to earn financial return (Demirguc-Kunt and Levine, 2008). Could therefore, type and nature of governance in the region determine inequalities? This is because bad governance may, also render financial development impotent towards improving economic welfare or reducing income inequalities by promoting financial market imperfections (Chong and Gradstein, 2007) and corruption (Gupta, Davoodi and Alonso-Terme, 2002) which limit access to finance by the poor. There are extensive studies on finance-growth-inequality nexus (kavya and Shijin, 2019) with unresolved theoretical and empirical results. The role of governance in the finance-inequality relationship has not been majorly considered in the literature despite the recommendation of both United Nation Development Programme (2017) and 2017 African Economic Conference which had its theme as *Governance for Structural Transformation* that African leaders should strive for and prioritise a good governance as a measure of achieving income equity and other development programmes.

It is therefore, becomes imperative to consider the influence of governance in finance-inequality equation in Africa which has attracted little or no attention (Kunawotor, Bokpin, and Barnor, 2020). The motivations for this work are therefore, (i) not many study on the financial development-inequality nexus have been reported from Africa, (ii) extant literature have captured financial development in a narrow a way by employing single indicator[1] to measure financial development, this is not sufficient for robust analysis for a developing economy like African countries with low level of financial inclusion different from other continents, see Table 1 (iii) to the best of knowledge, not up to three papers have attempted to investigate the influence of governance in the financial development and inequality nexus in Africa. Hence, this research work breakdowns the role of governance on financial development in mitigating income inequality in the African countries using principal component analysis (PCA) to derive a comprehensive measure to capture of financial development from World Bank financial development indicators. The study fills this gap in the literature. Specifically, in the study of Adeleye, Vo and Gbolahan (2017), credit of the bank to private sector was adopted to measure financial development, this work departs by employing PCA to develop a wholesome/overall measure that is adequate and comprehensive by selecting one across the mainstay of the World Bank measures of financial development indicator as shown in Table 1 for African economy, this is the contribution of this study to the literature. The study adopts Generalized Methods of Moment (GMM) to address the problem of endogeneity and serial autocorrelation that may arise in a panel data framework of 41 African economies from 2001 to 2020. The study is organised into 5 sections. Section 2 reviews related past studies, which is followed by methodology in section 3 and section 4 presents empirical findings and analyses. The study is wrapped up by section 5, which contains conclusion.

Table 1 World Bank Metrics of Financial Development

Mainstay	Institutional Metrics
Access	Accounts in commercial banks per 1000 adults (Commercial Banks); Branches per 100,000 adults
Depth	Private credit to GDP; Financial institutions' asset to GDP; M2 to GDP; Deposits to GDP; Gross value-added of the financial sector to GDP
Stability	z-score (or distance to default); capital adequacy ratios; asset quality ratios; liquidity ratios; other (net foreign exchange position to capital etc.
Efficiency	Net interest margin; lending-deposits spread; Non-interest income to total income; Overhead costs (%of total assets); Profitability (returns on assets, return on equity); Boone indicator (or Herfindahl or H-statistics)

Sources: Cihak et al. (2013); World Bank (2019)

REVIEW OF RELATED LITERATURE

Theoretical Review

Theoretically, there are 2 opposing positions on the finance-inequality relationship. The first position emanates from the report of Kuznet (1955) on development and income inequality. The report maintains an inverted U-shaped and the subsequent research work by Greenwood and Jovanovic (1990) known as Greenwood-Jovanovic hypothesis supports

[1] Some literature used financial deepening indicators such as the ratio of broad money supply M_2 to GDP (Furceri and Loungani, 2015); some also employed ratio of bank credit to GDP (Ojapinwa and Bashorun, 2014; Fromentin 2017); some used bank deposit to GDP (Chowdhury, 2016); some employed broad money supply to GDP (Fromentin 2017) and others used indicators of inclusion of finance (Anzoategui, Demirguc-kunt and Peria, 2014)

kuznet's proposition. The narrative is that at the early phase of economic development i.e. when financial sector is underdeveloped (agrarian stage), the income inequality is widen but slow down as economy develops into intermediate phase (industrial development stage) and then decline at maturity phase or during the rise in the service sector. At the maturity stage, financial opportunities are widened and accessible to the poor and thereby equalising the distribution of income. The second theoretical view as revealed in the work of Banerjee and Newman (1993) and Galor and Zeira (1993), however maintain that, the relationship between financial development and income inequality is direct because of the effect of imperfections in the financial market which may prevent the efficient resource allocation to the poor to have access to investable fund in both human and physical capital. Thereafter, these two successful theoretical controversies have been subjected to various empirical analyses which have produced results in support of either of the two theoretical positions.

Empirical Review

These contradictory theoretical positions on the impact of financial development on inequality have been subjected to several empirical test in the literature. It is however, necessary to underline those recent studies conducted within the African context. Batuo, Guidi and Mlambo (2010) investigates financial development and income inequality for 22 African economies between 1990-2004. The study utilizes Generalised Method of Moment (GMM) and finds that inequality reduces as financial sector develops in support of Banerjee and Newman (1993) and Galor and Zeira (1993). Asongu (2013) examines on how the reforms of financial sectors affect inequality in Africa through competition in the financial sector. The study finds that improvement in formal financial sector, informal financial sector, semi-formal financial sector reduces inequality, increases inequality, reduces inequality, reduces inequality respectively. Tita and Aziakpono (2016) examines finance-income inequality nexus for 15 African countries. The study adopts Augmented Mean Group estimation to find evidence of non-linear relationship which ranges from an inverted U-shaped to a U-shaped based on the variable adopted to measure of financial development which supports both theoretical arguments. Bolarinwa, Vo, and Olufolahan (2021) investigates the nexus between financial development and income inequality in Africa. The study finds for 40 selected African countries that ratio of private sector credit to GDP has increasing impact on inequality while total financial development produces mixed results by reducing income inequality in high, middle and low-income in African countries, and non-linear in low-income African countries. This study establishes both theoretical views in African countries.

Jauch and Watzka (2016) examines the relationship in 138 advanced and less-developed countries covering from the year 1960 to 2008. The study adopts fixed-effect two-stage least-squares (2SLS) technique, the study finds that financial development has a positive impact on inequality. Park and Shin (2017) examines this nexus in 162 economies covering from the year1960 to 2011. Based on panel data framework, the study finds that financial development reduce inequality up to a point, and later spurs inequality as it proceeds further. Liu, Liu, and Zhang (2017) examines this the relationship for 23 Chinese provinces covering 1996–2012. The study adopts GMM and finds a linear and inverted U-shaped relationship. The study provides evidence in support of financial Kuznets curve. Azam and Raza (2018) investigates this association in ASEAN-5 countries covering 1989–2013. The study uses fixed-effect model, and finds the evidence in support of financial Kuznets hypothesis.

Law, Tan, & Azman-Saini (2014) examines the nexus between financial development and income inequality for 81 countries covering 1985– 2010. The study adopts threshold cointegration approach and finds that the nexus between the two variable is controlled significantly by institutional quality, and that reduction in income inequality is achieved through better institutional quality that will influence the channels of financial development. Adeleye, Osabuohien, and Bowale (2017) examines the role institutions played in the relationship between finance development and income inequality for 45 African economies from the year 1996 to 2015. Using system GMM, the study finds that financial development does not significantly reduce inequality. The control of corruption and its interaction with measure of financial development reveals an inverted U-shaped with inequality. This paper however, contributes to the growing body of literature by examining the influence of governance in the nexus between financial and inequality in 41 African economies from the year 2001 to 2020. The study deviates from Adeleye et al. (2017) by adopting a more comprehensive measure of financial development derived from all mainstays of financial development as displayed by world bank (see Table 1) using principal component analysis (PCA).

METHODOLOGY

Model Specification

Following the theory particularly (Kunawotor, Bokpin and Barnor, 2020; Asongu, Nnanna, Acha-Anyi, 2020; Chu and Hoang, 2020), income inequality in a country depends on its past histories. This has introduced dynamism into the economic model relationships under consideration which is by captured by equation (1).

$$Iny_{it} = \varphi_0 + \sigma Iny_{it-\tau} + \beta F_{it} + \delta G'_{it} + \gamma X'_{it} + \mu_i + \omega_t + \varepsilon_{it} \quad \text{..... (1)}$$

where y_{it} represents the natural logarithm of the income inequality which is measured by gini co-efficient for selected African country, i, over time period t; $Iny_{it-\tau}$ is the natural logarithm of one year lagged of income inequality. F represents the proxy for financial development. G'_{it} and X'_{it} are the vectors of governance index and control variables. The country-specific fixed effects is μ_i while ω_t is the time-specific constant trend. ε_{it} is the remainder disturbance term.

τ is the coefficient of auto-regression and this is equal to one because of the fact that one year long enough to capture past histories in this work. φ_0 is a constant while $\sigma, \beta, \delta, \gamma$ are parameters. The theoretical application of GMM is appropriate because of the introduction of $Iny_{it-\tau}$ as one of the regressors. This led to the autocorrelation problem. Arellano and Bond (1991) difference GMM and Blundell and Bond (1998) system GMM estimators have been suggested in a good number of literature to overcome the problem. As the name connotes, difference GMM differences the equation (1) to derive equation (2)

$$y_{it} - y_{it-\tau} = \sigma(y_{it-\tau} - y_{it-2\tau}) + \beta(F'_{it} - F'_{it-\tau}) + \delta(G'_{it} - G'_{it-\tau}) + \gamma(X'_{it} - X'_{it-\tau}) + (\omega_t - \omega_{t-\tau}) + (\varepsilon_{it} - \varepsilon_{it-\tau}) \quad \text{.....(2)}$$

In order to remove the effects along with any time-invariant regressor. But the problem is that when variables are closed to a random work, the lagged levels are poor instruments for first differences. This justifies the application of system GMM estimator. In system GMM estimator, additional instruments will be generated to increase efficiency lagged alongside levels of variables as instruments for equations in first differences. Owing to the persistent nature of inequality data, the data is then transformed to five-year moving average period. GMM technique of analysis is applied because of the following reasons: (i) it has the potentials to deal with endogeneity in two ways: by taken into consideration unobserved heterogeneity time invariant omitted variables; it also control simultaneity bias or reversal causality by through internal instrumentation process generated; (ii) it is a panel data framework meaning that individual characteristic of the each country in the panel should be addressed; and (iii) the no of cross-sections (N=41) is greater that the no of time series in each cross section (T=20) i.e. N>T.

Data and Descriptive Statistics

The sole objective of this research work is to carefully inquire into the role of governance in the nexus between two variables of interest within African economies. The study adopts a balanced panel data covering the period of 2001-2020 for 41 countries. The Gini Index which is mostly used as a yardstick for income inequality. It ranges from 0 (perfect income equality) to 1 (perfect income inequality) is employed in this study to measure income inequality. The study sourced data from four sources, namely: (i) the Global Consumption and Income Project (GCIP); the World Development Indicators (WDI); the World Governance Indicator (WGI); and the Financial Development and Structure Database (FDSD). The Gini coefficient is sourced from GCIP while all control variables such as: gross capital formation; consumer price index; trade openness; Gross Domestic Product (GDP) per Capital; population growth rate, primary school enrolment rate are sourced from WDI. The main six governance variables, Control of Corruption; Government Effectiveness; Political Stability and Absence of Violence/Terrorism, Regulatory Quality, Rule of Law and Voice and Accountability are gotten from the World Governance Indicator (WGI). Also, four variables are employed across the pillars/mainstays of world bank measurement of financial development as shown in Table 1. These four variables, which cut across financial depth; access; efficiency; and stability are private sector credit to GDP; branches per 1000 adults (commercial banks); net interest margin and z-score. Branches per 1000 adults (commercial banks) is sourced from WDI while others are sourced from FDSD. As noted earlier, none of this measure is appropriate to capture financial development as used in related studies. The study therefore, employs PCA to construct overall financial development indexes; first principal component (PC1) and second principal component (PC2). In addition, 5-year moving average is adopted because of persistent nature of income inequality data.

Table 2 Descriptive Statistics

Variables	Obs	Mean	SD	Min	Max
Gini Index	820	0.583	0.0378	0.441	0.852
Overall Fin. Devt (PC1)	820	0.0708	1.423	-2.473	4.515
Overall Fin. Devt (PC2)	820	-0.0729	0.834	-1.943	2.829
Gross Capital Formation	820	24.33	10.46	-0.0984	79.40
Consumer Price Index	820	114.6	133.9	7.347	3,365
Trade Openness	820	0.0656	0.0497	0.000404	0.300
GDP per Capital Growth Rate	820	0.0167	0.0416	-0.366	0.287
Population Growth Rate	820	0.0241	0.00912	-0.0259	0.0474
Primary Sch Enrolment Rate	820	99.99	21.33	35.37	192.7
Control of Corruption	820	-0.591	0.615	-1.572	1.230
Government Effectiveness	820	-0.665	0.617	-1.884	1.057
Political Stability	820	-0.502	0.886	-2.699	1.282
Regulatory Quality	820	-0.559	0.531	-2.027	1.127
Rule of Law	820	-0.602	0.619	-1.905	1.077
Voice and Accountability	820	-0.484	0.674	-1.851	0.983

Source: Author's computation (2022)

From Table 2, the data reveals that there is high income inequality in the continent as the both the minimum and maximum value reveal 44 percent and 85 percent and its average value is 58 percent with standard deviation of 3 percent. The implication of this is that, on the scale 0 to 1, the mean score of the continent is approximately 6 which oscillate between lowest score of 4 and highest score of 9 approximately. This is an indication that African countries are still

suffering from huge income inequality. South Africa recorded the greatest Gini score in the continent. Also, nearly all African countries are experiencing poor rating with few exceptions in some governance indicators. In Africa, best governance indicators are voice and accountability (-0.484) and political stability and absence of violence/terrorism (0.502) as they possess the greatest mean score, albeit relatively weak. The Table 3 reveals correlation matrix. It shows that there are negative relationships inequality and financial development indicators. This indicates that financial development tends to reduce inequality. However, there need to validate this preliminary result through econometrics analysis.

Table 3 : Correlation Matrix

Variables	Gini	PC1	PC2	GCAF	COPI	TOPN	GDPG	POPG	PRYE	COCO	GOEF	POST	REQU	RULA	VOAC
Gini Index	1														
Overall Fin. Devt (PC1)	-0.12	1													
Overall Fin. Devt (PC2)	-0.07	0.008	1												
Gross Capital Formation (GCAF)	-0.01	0.17	0.079	1											
Consumer Price Index (COPI)	0.062	-0.04	0.221	0.068	1										
Trade Openness (TOPN)	0.014	-0.48	-0.04	0.068	-0.1	1									
GDP per Capital Grth Rate (GDPG)	-0.03	-0.02	0.068	0.127	-0.11	0.058	1								
Population Growth Rate (POPG)	-0.02	-0.46	-0.08	-0.16	0.008	0.14	0.025	1							
Pry Sch Enrolment Rate (PRYE)	0.05	0.068	0.095	0.014	-0.05	0.021	-0.052	-0.15	1						
Control of Corruption (COCO)	0.079	0.501	0.067	0.266	-0.10	-0.26	0.035	-0.58	0.16	1					
Government Effectiveness (GOEF)	0.022	0.545	0.199	0.251	-0.10	-0.382	0.061	-0.52	0.149	0.859	1				
Political Stability (POST)	0.141	0.301	-0.06	0.268	-0.10	-0.18	0.041	-0.34	0.246	0.728	0.68	1			
Regulatory Quality (REQU)	0.098	0.417	0.194	0.174	-0.12	-0.286	0.051	-0.40	0.144	0.794	0.906	0.653	1		
Rule of Law (RULA)	0.06	0.495	0.152	0.264	-0.05	-0.333	0.031	-0.50	0.18	0.898	0.914	0.765	0.877	1	
Voice and Accountability (VOAC)	0.134	0.277	0.087	0.156	-0.09	-0.2	0.032	-0.36	0.207	0.799	0.74	0.683	0.74	0.807	1

Source: Author Computation (2022)

EMPIRICAL FINDINGS AND ANALYSIS

Findings and Analysis

The study examines the composition of the PCA model to derive overall financial development, which comprises of all four main pillars of financial development indicators [i.e. Depth; Access; Efficiency; Stability]. The *do file command from STATA 15.0* and result are available on request. Apart from this, the empirical findings of the dynamic model are reported in Table 4. The result of the baseline model is reported in column [1] which comprises of 41 sampled African countries. The columns [2] to [7] reveal models of governance indexes and their interactions with financial development. One-period lag of the logged Gini index captures the dynamism of the model and it is not only positive but also statistically significant at 1 percent in all the models from [1] to [7]. This confirms the recent argument of the existence of endogeneity, reversal causation (Zhang & Naceur, 2018) and the persistence nature of Gini index over time, which indicates that static models are grossly inappropriate. The appropriateness of dynamic models is supported by the empirical findings of the study. Furthermore, probability value of the Hansen tests show that they are not significant which points to the fact that the instruments used in the models are not over-identified. The study further tests for Arellano and Bond first and second-order autocorrelation. The results reveal that the specifications do not suffer from autocorrelation as their p-values are not statistically significant. Hence, for policy formulation, the estimates in the study are robust, reliable and appropriate.

Column [1] shows the baseline of the regression result. Financial development is measured by overall financial development derived through PCA from mainstay of financial development indicators as shown in Table 1. The regression result of the baseline model supports the linear hypothesis of Galor and Zeira (1993) and Banerjee and Newman (1993); Aziakpono (2016); Jauch and Watzka (2016); Liu, Liu and Zhang (2017) and Bolarinwa, Vo and Olufolahan (2012). The study finds no evidence in support of the inverted U-shaped hypothesis. Column [2] to [7] reveal the role of governance in the nexus of the two variables is captured by interacting financial development with six governance indicators. The overall financial development, though statistically insignificant but it has positive sign in all the model specifications. The coefficients of the control of corruption (0.00554) and government effectiveness (0.00867) are positive and statistically insignificant while their coefficients of interaction with financial development (0.00527) and (0.00350) are also direct and statistically significant at 10 percent. The interpretation of this is that the marginal impact of change in the control of corruption and government effectiveness has a positive effect on income inequality given an increase in the financial development. The coefficient of rule of law (0.00649) is positive and statistically significant at 10 percent. Its interactive term together with others are positive and statistically insignificant.

The following are the salient points derived from this result. Firstly, the positive but statistically insignificant coefficients of financial development in all model specifications except model [5] are possible indications that the financial system in the sub-Saharan African countries are still underdeveloped. That it has positive signs shows that there is hope but far from being adequate to drive inequality in Africa. Secondly, the interactions of measure of financial development with control of corruption and rule of law have an elevating impact on income inequality. This implies that if there is a rule of law and corruption is also controlled, given an increase in financial development, then income inequality will escalate in Africa. This is contrary to the expectation.

Table 4 System GMM Estimates

Dep. Var.: Log of Gini Index	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Constant	-0.0344	-0.0438	0.00712	-0.0391	-0.0326	-0.0311	-0.0657*
	(0.0384)	(0.0530)	(0.0502)	(0.0453)	(0.0505)	(0.0432)	(0.0368)
Log of Gini index_1	0.960***	0.932***	0.955***	0.951***	0.919***	0.925***	0.919***
	(0.0406)	(0.0631)	(0.0472)	(0.0461)	(0.0663)	(0.0446)	(0.0609)
Overall FD (PC1)	0.000615	0.00190	0.000926	0.00122	0.00237*	0.000742	0.00141
	(0.00073)	(0.0014)	(0.0013)	(0.00139)	(0.0014)	(0.0012)	(0.00108)
Log of Gross Capital Form.	0.00106	-0.00051	-1.4e-06	-0.000845	-0.000129	-0.000394	-4.05e-05
	(0.00185)	(0.0023)	(0.0017)	(0.00169)	(0.00230)	(0.00170)	(0.00185)
Log of Consumer Price Inde	-0.0039**	-0.00161	-3.5e-05	-0.00155	-0.00243	-0.00285	-0.00332
	(0.00187)	(0.0027)	(0.0023)	(0.00229)	(0.00189)	(0.00215)	(0.00254)
Log of Trade Openness	-0.000383	-0.00029	0.000582	-0.000279	7.12e-05	-0.000682	-0.000715
	(0.00110)	(0.0010)	(0.0014)	(0.00101)	(0.00161)	(0.00133)	(0.00107)
Log of GDP per Capital	3.91e-05	-0.00014	0.000154	-0.000111	8.85e-05	5.82e-05	-3.26e-06
	(0.00038)	(0.0004)	(0.0003)	(0.00042)	(0.000446)	(0.00035)	(0.000351)
Log of Population Growth	0.00210**	0.00465	0.00747*	0.00278*	0.00586*	0.00516**	0.00184
	(0.00092)	(0.0031)	(0.0040)	(0.00167)	(0.00347)	(0.00255)	(0.00139)
Log of Pry Sch Enrolment	0.00725	0.00735	0.000626	0.00717	0.00547	0.00543	0.00921*
	(0.00545)	(0.0101)	(0.0082)	(0.00870)	(0.00661)	(0.00739)	(0.00521)
Control of Corruption		0.00554					
		(0.0045)					
Overall FD1*Corruption		0.00527*					
		(0.0031)					
Government Effectiveness			0.00867				
			(0.0063)				
Overall FD1*Govt. Effect.			0.00350*				
			(0.0019)				
Political Stability				0.00384			
				(0.00239)			
Overall FD1*Pol. Stability				0.00279			
				(0.00230)			
Regulatory Quality					0.00848		
					(0.0067)		
Overall FD1*Reg. Quality					0.00561		
					(0.0039)		
Rule of Law						0.00649*	
						(0.0038)	
Overall FD1*Rule of Law						0.00304	
						(0.0023)	
Voice and Accountability							0.00315
							(0.00226)
Overall FD1*Voice and Acct							0.00232
							(0.00190)

No of Observations	548	548	548	548	548	548	548
No of Countries	41	41	41	41	41	41	41
No of instruments	201	201	201	201	201	201	201
GMM Instrumt Lag	1	1	1	1	1	1	1
AR(1)	0.287	0.284	0.281	0.281	0.287	0.287	0.287
AR(2)	0.482	0.364	0.497	0.482	0.605	0.372	0.442
Hansen Test	0.269	0.443	0.715	0.542	0.335	0.787	0.768

Note: Robust option is employed. Standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1 represent significance at 1%.5% and 10% respectively. *xtabond2* is employed for the estimation

Robustness Check

Robustness checks are carried out in two different ways. Firstly, overall financial developments derived with principal component analysis (PCA) are in two forms PC1 and PC2. Since the next best alternative to PC1 is PC2, hence, we test the use of Overall FD (PC2) (see Table 5). The major difference is that across all model specifications, none of the governance indicators together with their interactive terms is significant. They however, have in common across all the specifications, the measure of financial development, Overall FD (PC2) is also positive and statistically insignificant. None of the model suffers from serial autocorrelation.

Table 5 System GMM Estimate : Robustness Check - 1

Dep. Var. : Log of Gini index	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	-0.0463	-0.0437	-0.0406	-0.0480	-0.0313	-0.0384	-0.0432
	(0.0379)	(0.0404)	(0.0436)	(0.0427)	(0.0352)	(0.0438)	(0.0503)
Log of Gini index_1	0.956***	0.931***	0.946***	0.932***	0.957***	0.929***	0.949***
	(0.0377)	(0.0526)	(0.0500)	(0.0536)	(0.0636)	(0.0483)	(0.0434)
Overall FD (PC2)	0.000559	0.00165	0.00148	0.000621	0.00171	0.00312	0.000950
	(0.00161)	(0.00281)	(0.00264)	(0.00157)	(0.00222)	(0.00335)	(0.00186)
Log of Gross Capital Form.	0.000999	-0.000107	0.000403	-0.000219	0.000323	1.41e-05	0.000727
	(0.00187)	(0.00202)	(0.00192)	(0.00185)	(0.00234)	(0.00181)	(0.00207)
Log of Consumer Price Inde	-0.00407	-0.00298	-0.00262	-0.00241	-0.00264	-0.00372*	-0.00382*
	(0.00267)	(0.00187)	(0.00195)	(0.00240)	(0.00213)	(0.00198)	(0.00218)
Log of Trade Openness	-0.000799	-5.38e-05	-1.11e-05	-0.00114	-0.000447	-0.000197	-0.000875
	(0.00163)	(0.00147)	(0.00140)	(0.00127)	(0.00135)	(0.00134)	(0.00135)
Log of GDP per Capital	-0.000188	-6.08e-05	4.70e-05	-3.91e-05	8.92e-05	-5.48e-05	-3.16e-05
	(0.000521)	(0.00037)	(0.00032)	(0.000397)	(0.00038)	(0.000399)	(0.000413)
Log of Population Growth	0.00157	0.00332	0.00265	0.00238	0.00359	0.00330	0.00204
	(0.00193)	(0.00297)	(0.00206)	(0.00220)	(0.00275)	(0.00245)	(0.00196)
Log of Pry Sch Enrolment	0.00881	0.00746	0.00714	0.00630	0.00707	0.00657	0.00783
	(0.00602)	(0.00581)	(0.00518)	(0.00611)	(0.00554)	(0.00701)	(0.00730)
Control of Corruption		0.00406					
		(0.00375)					
Overall FD2*Corruption		0.00148					
		(0.00385)					
Government Effectiveness			0.00217				
			(0.00377)				
Overall FD2*Govt. Effect.			0.00138				
			(0.00247)				
Political Stability				0.00240			
				(0.00207)			
Overall FD2*Pol. Stability				0.000212			
				(0.000850)			
Regulatory Quality					0.00324		
					(0.00523)		
Overall FD2*Reg. Quality					0.00204		
					(0.00251)		
Rule of Law						0.00428	
						(0.00380)	
Overall FD2*Rule of Law						0.00393	
						(0.00400)	
Voice and Accountability							0.00151
							(0.00208)
Overall FD2*Voice and Acct							0.000916
							(0.00204)

Note: Robust option is employed. Standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1 represent significance at 1%.5% and 10% respectively. *xtabond2* is employed for the estimation

In the second form of robustness check, the study test with the use of 2 lags since the system GMM is fragile to the selection of erratic lag length limits (see Table 6). The study finds that except for model [1], the measure of financial development is direct and statistically insignificant. The result shows that model [1] is suffering from serial autocorrelation with a statistically significant of p(value) of AR(1). Hence, the model is not robust and reliable for policy formulation.

Table 6 System GMM Estimate: Robustness Check - 2

Dep. Var. : Log of Gini index	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	-0.0907	-0.0790	-0.0458	-0.0364	-0.0682	-0.0561	-0.0526
	(0.0678)	(0.0678)	(0.0773)	(0.0976)	(0.0942)	(0.0644)	(0.0763)
Log of Gini index_ 2	0.864***	0.825***	0.867***	0.909***	0.842***	0.858***	0.867***
	(0.0762)	(0.0976)	(0.0684)	(0.0914)	(0.0895)	(0.0598)	(0.0819)
Overall FD (PC1)	-0.000183	0.00384	0.00128	0.000921	0.00327	0.00102	0.00195
	(0.000894)	(0.00364)	(0.00208)	(0.00102)	(0.00203)	(0.00153)	(0.00266)
Log of Gross Capital Form.	0.000418	-0.00199	-0.00116	-0.00214	-0.000499	-0.000784	-0.00172
	(0.00298)	(0.00277)	(0.00363)	(0.00284)	(0.00369)	(0.00293)	(0.00332)
Log of Consumer Price Inde	-0.00549	0.000376	-0.00114	-0.00230	-0.00266	-0.00139	-0.00330
	(0.00364)	(0.00467)	(0.00402)	(0.00408)	(0.00442)	(0.00378)	(0.00452)
Log of Trade Openness	-0.00114	-0.00213	-0.00125	-0.00139	-0.00157	-0.00181	-0.000926
	(0.00128)	(0.00150)	(0.00189)	(0.00187)	(0.00166)	(0.00165)	(0.00166)
Log of GDP per Capital	-0.000785	-0.00120*	-0.000384	-0.000918	-0.000393	-0.000492	-0.000325
	(0.000688)	(0.000718)	(0.000605)	(0.00057)	(0.000441)	(0.000650)	(0.000698)
Log of Population Growth	0.00145	0.00336	0.00708	0.00395	0.00603	0.00407	0.00404
	(0.00346)	(0.00341)	(0.00495)	(0.00317)	(0.00542)	(0.00378)	(0.00360)
Log of Pry Sch Enrolment	0.00852	-0.00234	0.00155	0.00252	0.00358	-0.000174	0.00288
	(0.00838)	(0.0114)	(0.00976)	(0.0134)	(0.0125)	(0.0117)	(0.0117)
Control of Corruption		0.00714					
		(0.00699)					
Overall FD1*Corruption		0.0134*					
		(0.00777)					
Government Effectiveness			0.00855				
			(0.00701)				
Overall FD1*Govt. Effect.			0.00493				
			(0.00399)				
Political Stability				0.00260			
				(0.00270)			
Overall FD1*Pol. Stability				0.00276			
				(0.00188)			
Regulatory Quality					0.0101		
					(0.0126)		
Overall FD1*Reg. Quality					0.00800		
					(0.00506)		
Rule of Law						0.00869	
						(0.00715)	
Overall FD1*Rule of Law						0.00496*	
						(0.00297)	
Voice and Accountability							0.00584
							(0.00471)
Overall FD1*Voice and Acct							0.00440
							(0.00380)
No of Observations	520	520	520	520	520	520	520
No of Countries	41	41	41	41	41	41	41
No of instruments	199	199	199	199	199	199	199
GMM Instrumt Lag	2	2	2	2	2	2	2
AR(1)	0.093	0.131	0.106	0.101	0.116	0.107	0.100
AR(2)	0.321	0.326	0.320	0.322	0.314	0.324	0.316
Hansen Test	0.566	0.589	0.982	0.683	0.713	0.985	0.750

Note: Robust option is employed. Standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1 represent significance at 1%.5% and 10% respectively. *xtabond2* is employed for the estimation

CONCLUSION

The sole aim of this work is to investigate the influence of governance on the nexus between financial development and income inequality in African. In the process of achieving this objective, the study investigates: (1) the nexus between financial development and income inequality and (2) the influence of governance indicators in the nexus between two variables of interest in 41 African countries in a panel data framework from 2001 to 2020. The areas of contribution to the subject matter are in 4 forms: (1) that the income inequality measured by the Gini index is persistent in African countries given the coefficient of the lagged Gini index to be positive and statistically significant; (2) that controlling the corruption and the rule of law given an increase in financial development has a statistically significant and increasing impact on inequality in Africa; (3) that the positive but statistically insignificant of measure of financial development indicates that the financial system in African countries are still relatively underdeveloped and that series of financial reforms have little

or no impact on income inequality but there is still hope for improvement; (4) that all the governance indicators have insignificant positive impact on the inequality in the African countries. On the role of governance, with the rule of law and control of corruption in the region, given an increase in financial development, the study finds that it would lead increase in income inequality. The benefits of such increase in financial development would only enable the rich to get richer.

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APPENDIX

A. List of selected African countries in the study

A-C	Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central Africa Republic, Chad, Congo, Dem Rep, Congo, Republic, Cote d'Ivoire, Comoros
D-K	Djibouti, Egypt, Gabon, Gambia , Ghana, Guinea, Guinea Bissau, Kenya
L-N	Liberia, Lesotho, Mali, Morocco, Mauritius, Mauritania, Mozambique, Namibia, Niger, Nigeria
S-Z	Senegal, Seychelles, Sierra Leone, South Africa, Sudan, Tanzania, Togo, Tunisia, Uganda, Zambia

B. Description of Variables

Variables	Description
Gini Index	This measures the distribution of income
Overall Financial Development (PC1)	Derived by the Author using four indicators of financial development of private sector credit to GDP; Commercial banks branches per 1000 adults; net interest margin and z-score.
Overall Financial Development (PC2)	Best alternative to PC1 estimated by the Author.
Growth of GDP per capital	GDP per capita is GDP divided by mid-year population. It is calculated as $\frac{GDP_{(2002)} - GDP_{(2001)}}{GDP_{(2001)}}$ (Data in constant 2015 U.S. dollars)
Gross Capital Formation	It consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories.
Consumer Price Index	Data are period averages and reflect changes in cost to the average consumption of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.
Trade Openness	Estimated as the difference between Exports and Import divided by GDP
Population Growth Rate	Changes in total population based on de-facto definition of population, which accounts for all residents irrespective of legal status. The values shown are mid-year estimates. It is calculated as $\frac{P_{(2002)} - P_{(2001)}}{P_{(2001)}}$
Primary Sch Enrolment Rate	Gross enrollment ratio is the ratio of total enrollment in elementary schools, irrespective of age, to the age group's population that officially corresponds to the shown tier of education.
Control of Corruption*	Shows perception of the degree of the exercise of public power for individual private benefit.
Government Effectiveness*	Captures perception of the quality of public services, the civil service and the degree of its autonomy from political pressures, policy formulation and implementation quality, and government's credibility in terms of commitment to such policies.
Political Stability and Absence of Violence/Terrorism*	Indicates perception of the possibility of instability in politics and/or violence motivated by politics, including terrorism.
Regulatory Quality*	Illustrates perception of government's ability to formulate and implement strong policies and regulations that allow and support the development of the private sector.
Rule of Law*	Shows perception of the degree to which agents possess confidence in and abide by the rules of society, especially contract enforcement, property rights, the police, and the courts, and the tendency of violence and crime.
Voice and Accountability*	Captures perception of the degree to which citizens can participate in selecting their government, and freedom of expression, association, and a free media.

* Estimate gives the score or rating of a country between -2.5 and 2.5 based on the aggregate indicator