

Interaction Effect of Financial Inclusion and Institutional Quality on Living Standard in Sub-Saharan Africa

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Abstract

The effects of financial inclusion and institutional quality on living standard in developing countries are documented in the empirical literature but results are inconclusive. This study examines the interaction effect of financial inclusion and institutional quality on living standard in sub-Saharan Africa. Using panel data on 45 Sub-Saharan African countries from 2004 to 2021, the study employed the two-step system Generalized Method of Moments for the analysis while quantile regression was deployed to assess the reliability of the GMM estimations. Two interaction variables (control of corruption interacting with number of ATMs, and regulatory quality interacting with number of ATMs) were used. The empirical results indicate that the interaction between control of corruption and number of ATMs have a significant and negative effect on living standard; while the interaction between regulatory quality and the number of ATMs have a significant positive effect on living standard in sub-Saharan Africa. The results are robust to the alternative estimation technique employed. The study therefore, advocates that governments in various Sub-Saharan African countries should initiate and implement measures aimed at curtailing corruption and improve regulatory quality in order to enhance financial service inclusivity and through that improve the living standard in the region.

Keywords: Financial inclusion, institutional quality, living standard, interaction

JEL Classification: G21, E02, I31, C33

1. Introduction

Interaction of financial inclusion indicators and that of institutional quality and their effect on economic outcomes have become an issue of discourse especially in Sub-Saharan Africa (SSA). The discussion is hinged on the role they play in improving

living standard (Aracil, Gomez-Bengoechea, & Moreno-de-Tejada, (2021). Following theoretical assertions such as (Galor & Zeira, 1993; Banerjee & Newman, 1993) supporting the role of finance in an economy, different countries of the world have made progress in improving financial inclusion. Available records have shown that Sub-Saharan Africa has made little progress in inclusive finance as the number of bankable individuals with accounts in a commercial bank increase from 23.3% in 2011 to 29%, 33% and 40% in 2014, 2017 and 2021 respectively, (World Bank, 2021). However, the living standard of the people has been declining instead of improving, as such, this progress has not manifested in improving the living standard in the Sub-Saharan region. As at 2021, 41% of individuals classified as poor suffer from poor electricity, sanitation and housing across 111 developing countries. Out of these countries, Sub-Saharan Africa account for 66.2 % of the people, while 11.4 % are in South Asia and 0.2% in Europe and Central Asia, (UNDP, 2022). The World Bank (2021) put the number of people living in very poor living conditions in SSA, to have increased between 2010 and 2020 in 26 countries.

This poor living condition in SSA has prevented the people from demanding for financial services; as a result, they cannot use the formal financial services (Kumar, 2019). Irregular or low income level affect the demand for financial services of the poor even though they have access to them (World Bank, 2016). Some may even demand for formal financial services through a relative's bank account, or may not make demand at all due to some socio-cultural reasons. Despite the low demand for financial services in SSA that exclude people from accessing formal financial services, there are also situations where majority of individuals experience financial exclusion due to non-availability of financial institutions to supply the needed services (Peachay & Roe, 2004). These groups of individuals are excluded from formal financial services due to the unavailability of commercial banks, cash centers or microfinance banks in their area that can render the needed financial services. This is supported by the (World Bank, 2021) report which shows that SSA has huge unmet demand for saving and borrowing from formal financial institutions. Only 14.3% saved in a formal institution in SSA in 2011, 16% in 2014, 15% in 2017 and 16% saved in a formal institution in 2021. Furthermore, the rise in formal borrowings is slow from 4.8% in 2011 to 6.3% in 2014 to 8% and 10% in 2017 and 2021 respectively (World Bank, 2021).

Some individuals are financially excluded due to stringent requirements needed in borrowing from banks, high interest on borrowed funds, due to the transaction charges or deductions from customers accounts by banks, (Simatele & Maciko, 2022; Peachay & Roe, 2004). However, if high transaction costs and other barriers to financial inclusion exclude large parts of the population, this may be a sign of underdeveloped or poor institutional quality, (Zins & Weill, 2016). Weak regulatory environment might

violate regulations on financial transaction charges by banks in order to achieve their personal goals. Thus, for transaction costs and charges to be moderated especially in Sub-Saharan Africa, institutional quality is the missing link (Hope, 2017; Khan & Naeem, 2020). Sub-Saharan Africa has performed poorly regarding control of corruption, regulatory quality and other indicators of institutional quality. For instance, the average corruption perception index for SSA stood at 33 points out of 100 in 2021 and 32 points in 2020, with majority of the countries stagnating in their CPI records with scores below 50 points, (Transparency International, 2021).

The contribution of the study to the growing empirical literature on inclusive finance and living standard is in two major ways. First, it improves the understanding on the role of interaction between financial inclusion and institutional quality in explaining the level of living standard. Results of past investigations are mixed (see Suhaibu, Andani, & Anaf, 2022). The need for deepening the findings on the interactions between financial inclusion and more than one institutional quality indicator in Sub-Saharan Africa is warranted. Second, and importantly, although some previous studies have examined how inclusive finance impact on the performance of the economy in Sub-Saharan Africa (e.g., Nsiah, Yusif, Tweneboah, Agyei & Baidoo, 2021; Menyelim, Babajide, Omarkhanlen, & Ehikioya (2021), they did not however consider the influence of institutional quality in the relationship. Given the record of poor institutions in SSA, the impact of financial inclusion in improving living standard is expected to be reduced when the interaction effect of financial inclusion and institutional quality is empirically investigated. The study is structured as follows; the introduction is followed by the literature review in section two and the methodology in section three. Section four covers the results and associated discussions, while the conclusion is in section five.

2. Literature Review

Conceptual Clarifications

Interaction between variables occurs when the variables are combined to ascertain their impact on the dependent variable. In other words, the effect of the combined independent variable on the outcome becomes larger or changes depending on the influence of one of the independent variables (Andersson, Cuervo-Cazurra, & Nielsen, 2014). In relation to the study, interaction effect means that financial inclusion and institutional quality combined to have a significantly larger effect on living standard as compared to that of the individual financial inclusion and institutional quality variables.

Despite its prominence in the financial literature, financial inclusion has been conceptualized differently by many scholars. It has been defined as a situation where there is equal chance for everyone to access the available financial services, (Nanda &

Kaur, 2016). Also, (Shankar, 2013; and World Bank, 2018) see financial inclusion as the proportion of citizens that utilize formal financial institutions for their services such as making payments, savings, credit and other transactions. These definitions laid more emphasis on usage of financial products without pinpointing access dimensions of financial inclusion and the institutions that provide the services to the people. A definition that involves usage of financial services is given by United Nations (2006), which is seen as the opportunity to use the range of financial products at an affordable cost for the bankable populace. This conceptualization did not consider having access to the financial products and the institutions that supply the products. Thus, this study conceptualized financial inclusion as a situation where by individuals in a society are able to access and use financial products and services from formal financial institutions at affordable cost. Such services include credits, savings, deposits, cash transfers, payments and other transactions.

In addition, this study also views institutional quality as a situation where a country's institutions ensure sound and good values that are free from corruption, poor regulatory quality and financial mismanagement. This adds value to the definition of (Lehne, Mo & Plekhanov, 2014) that conceptualized institutional quality as the ability of a society to maintain law and order, control corruption, protect property rights, or the manner in which civil and public activities are carried out. The definition of (Lehne, Mo & Plekhanov, 2014) did not consider quality delivery of financial services in their definition. In conceptualizing living standard, the study adopts the definition given by (United Nations Development Program, 2021) as a process of enlarging people's choices which is exhibited in form of human development. The most vital aspects of this definition is the fact that it incorporated both income and non-income aspects of living standard such as long and healthy living, and basic education. This is depicted using the human development index as an indicator that measures both income and non-income aspects of living standard.

Theoretical Framework

The work is premised on finance income inequality theory by Galor and Zeira (1993) and Banerjee and Newman (1993). The theory posits that with the improvement in the financial system, the previously excluded low income earners are enabled to access and use financial products such as credit facilities thereby improving their living conditions (Galor & Zeira, 1993; Banerjee & Newman 1993). The main argument of the theory is that improvement in financial services lead to removal of restrictions in the form of transaction costs and other high charges affecting the low income earners from accessing the financial products and thereby enhancing their living conditions (Rajan & Zingales, 1998). This is the case in SSA where low income earners cannot access

credits from banks due to tough conditions and high interest charges attached to the credits.

Relating further to the concepts of financial inclusion, institutional quality and living standard, the theory posits that poor regulatory standard in the financial markets bring about high transaction costs or interest charges, which is beyond the reach of the poor and low income earners. As a result, denying or limiting them access to formal financial services. Thus, with development in the financial markets alongside improvements in financial inclusion and regulation of transaction costs, the poor can save or borrow money from formal financial institutions to engage in income generating activities which will improve their living conditions.

Empirical Literature Review

There are a lot of empirical studies supporting positive or negative effect of financial inclusion and institutional quality on living standard. Studies have revealed that positive and significant nexus between financial inclusion, institutional quality and living standard. Nambie & Obobi (2022) examined the link between financial inclusion, institutional quality and human development of 42 African nations from 2012 to 2021. Although their study did introduce interaction term in their model, however, using the GMM, the study revealed a significant positive nexus between financial inclusion, human development and institutional quality in Africa. Also, Yiadom, Dziwornu & Yalley, (2021) examined the moderating role of institution in the relationship between financial inclusion, poverty levels and economic growth in Africa. The study found that institutional quality plays a significant role in explaining the impact of financial inclusion on growth nexus and in explaining the impact of financial inclusion on poverty reduction using a GMM and a panel data of 42 countries from 2011 to 2018.

Studies on the interaction effect of financial inclusion and institutional quality on living standard indicators came out with mixed findings. In this context, Mohammed, (2021) investigated how remittance interact with institutions to impact on human development in SSA from 2004 to 2018. To address the objectives, the study used the system Generalized Method of Moments and revealed that institutions and remittance have an interaction impact on human development, showing that remittances improves human development in nations with quality institutions. In the same vein, (Aracil, Gomez-Bengochea, & Moreno-de-Tejada, 2021) examined how institutional quality and financial inclusion interact to reduce poverty in a panel comprising of 75 low income countries and advanced countries between 2004 and 2017. Adopting the OLS and quantile regressions, the study found that institutional quality solidifies the impacts of financial inclusion on poverty reduction with the effect clearer in the low income economies than in richer ones.

Similarly, Saydaliyev, Chin & Oskenbayev, (2020) examined how remittances interact with institutional quality to influence inclusive finance in 70 less developed countries from 2011 to 2018. Adopting the GMM estimation technique, the study showed strong evidence that remittances and financial inclusion have a positive relationship, concluding that financial inclusion boost remittance inflow with strong institutional quality. However, Ajide, Raheem, Alimi & Asongu, (2020) examined indicators of institutional quality divided into political, economic and governance and their interactions with physical access to ATMs and how they influence economic growth in 20 Sub-Sahara Africa countries. Adopting the System GMM, their study found that the interactions between physical access to ATMs and political institutional variable, economic institutional variable and institutional governance have negative and insignificant impact on economic growth in SSA countries. Studies have also examined how financial inclusion directly impact on living standard and how institutional quality impact on living standard without interactions. Ofori-Abebrese, Baidoo and Essiam (2020) estimated the influence of financial inclusion on welfare using a panel of 33 sub-Saharan African countries in 2017. Adopting the ordinary least squares technique, the study found that financial inclusion has positive impact on welfare in SSA. Similarly, Bakari, Donga, Idi, Hedima, Willson, Babayo and Ibrahim (2019) conducted a study aimed at finding out the impact of financial inclusion on poverty in SSA, using a panel data comprising of 49 countries in SSA from 1980 to 2017 and adopting a static fixed effect and random effect models, their study found strong evidence that financial inclusion impact on poverty reduction in SSA. The indicators of financial inclusion that impact on poverty are savings, credits to the private sector as percentage of GDP, access to ATM, and access to digital and electronic facilities.

Suhaibu, Andani, & Anaf, (2022) investigated the link between quality of institutions, financial development and living standard in 20 Sub-Saharan Africa countries from 2000 to 2019. The study analyzed the data using the panel VAR framework and the result showed that institutional quality and its interaction with financial development has no direct impact on living standard in SSA. Olong, Fonchamyo and Sama (2019) examined the impact of quality of institutions proxied by economic freedom and corruption on living standard proxied by human development index in Africa between 2000 and 2018. The analysis was carried out using the panel Autoregressive Distributed lag model. The result indicated that institutional quality proxied by economic freedom has a strong significant influence on economic welfare while institutional quality represented by corruption negatively impact on economic welfare in Africa.

The empirical findings reviewed indicates that research have conflicting results relating to positive or negative interaction of financial inclusion and institutional quality and their effect on living standard in SSA as revealed in the study of (Suhaibu, Andani, &

Anaf, 2022 and Ajide, Raheem, Alimi & Asongu, 2020). This implies that there is need for further studies on how inclusive finance interacts with quality of institutions in sub-Saharan Africa.

3. Methodology

The list of countries covered in the study is presented in appendix 1 and the study period is from 2004-2021, based on the availability of data for the countries covered in the study, the data for the financial inclusion and institutional quality variables were sourced from the 2021 world development indicators (WDI) database, while the human development index data is sourced from the database of the United Nations Development Programme (2021). Living standard is measured with human development index (HDI). The human development index measures both income and non-income aspects of living standard which have been supported by these studies, (Omokanmi & Ogunleye, 2020; Olong, Fonchamyo & Sama, 2019; Aloui 2019). The independent variables are; credit to private sector from banks as a ratio of GDP (CPS/GDP) representing financial inclusion. It consists of how customers used the credits from banks to produce output and meet their living conditions. Automated teller machines (ATMs). Number of commercial bank branches (NBB) (per 100,000 adults). The use of these variables is supported by studies such as (Yiadom, Dziwornu & Yalley 2021; Ha & Nguyen 2021). Corruption and regulatory quality are proxies for institutional quality (INQ). The two variables measure the extent to which public and private institutions exercised power for personal gain and interests and regulate the contracts and transactions, (Ha and Nguyen (2021), and Olong, Fonchamyo and Sama (2019).

A pre-testing of time series of the data would have been conducted if the time period covered in the study is long to tally with the cross-sections. However, the two step system Generalised Method of Moments (GMM) estimation technique make it possible for using a panel data which do not require pre-estimation test. The study employed the difference in Hansen Test to examine how reliable the exclusion restrictions of the exogenous instruments are, which is a test that examined whether the instruments used are truly exogenous under the necessary conditions. In checking the exact exogeneity assumption and for it to be valid, the hypothesis is not rejected. This test was done along with the Sargan J test for the reliability of the instruments and the Arellano-Bond (AR) test which test whether the error term is auto-correlated or not.

A functional relationship among financial inclusion, institutional quality and living standard is constructed in the following form:

$$LS = f(FI, INQ) \dots\dots\dots 1$$

where: L_s represents living standard variable proxied in this study by human development index (HDI). FI represents financial inclusion represented by credit to private sector from commercial banks as a ratio of GDP (CPS/GDP), number of Automated Teller Machine transactions (ATM), and branches of commercial banks per 100,000 adults (NCB). Indicators of institutional quality (INQ) are corruption (COC), and regulatory quality (RQTY). Thus, the adopted and modified form of equation (1) is stated as follows:

$$HDI_{it} = CPS/GDP, ATM, NCB, COC, RQTY \dots\dots\dots 2$$

To investigate the impact of financial inclusion and institutional quality on living standard the model is transformed into a dynamic model as shown as follows:

$$HDI_{it} = \alpha_i + \gamma_t + \beta_0 HDI_{it-1} + \beta_1 CPS/GDP_{it} + \beta_2 ATM_{it} + \beta_3 NCB_{it} + \beta_4 INQ_{it} + \mu_{it} \dots\dots\dots 3$$

Where $i=1, \dots, 45$ and $t=1, \dots, 18$. Equation (3) is transformed in first difference form in order to remove the individual effects and get a reliable estimate of the individual characteristics with T fixed:

$$HDI_{it} - HDI_{it-1} = \gamma_i - \gamma_{t-1} + \beta_0 \Delta HDI_{it-1} + \beta_1 \Delta CPS/GDP_{it} + \beta_2 \Delta ATM_{it} + \beta_3 \Delta NCB_{it} + \beta_4 \Delta COC_{it} + \beta_5 RQTY_{it} + \Delta \mu_{it} \dots\dots\dots 4$$

For conditions were some factors affecting living standard are growing from within the model, the study employed the system GMM (Arellano & Bover 1995; Blundell & Bond, 1998), specified as follows:

$$HDI_{it} = \alpha_i + \gamma_t + \beta_0 HDI_{it-1} + \sum_{j=0}^1 \beta_{1j} CPS/GDP_{it-j} + \sum_{j=0}^1 \beta_{2j} ATM_{it-j} + \sum_{j=0}^1 \beta_{3j} NCB_{it-j} + \sum_{j=0}^1 \beta_{4j} COC_{it-j} + \sum_{j=0}^1 \beta_{5j} RQTY_{it-j} + v_{it} \dots\dots\dots 5$$

Where; i represents the number of countries (45) used in the study; t represents the study time covered (2004-2021), while the error term is represented by μ . To analyze the interaction effect of financial inclusion and institutional quality on living standard the model is split into two, first is the model representing financial inclusion, control of corruption and their interaction as shown in equation 6:

$$HDI_{it} = \alpha_i + \gamma_t + \beta_0 HDI_{it-1} + \sum_{j=0}^1 \beta_{1j} CPS/GDP_{it-j} + \sum_{j=0}^1 \beta_{2j} ATM_{it-j} + \sum_{j=0}^1 \beta_{3j} NCB_{it-j} + \sum_{j=0}^1 \beta_{4j} COC_{it-j} + \sum_{j=0}^1 \beta_{5j} RQTY_{it-j} + \sum_{j=0}^1 \beta_{6j} (FI * COC)_{it-j} + v_{it} \dots\dots\dots 6$$

Equation 7 is the model representing financial inclusion, regulatory quality and their interaction which is stated as follows:

$$\begin{aligned}
HDI_{it} = & \alpha_i + \gamma_t + \beta_0 HDI_{it-1} + \sum_{j=0}^1 \beta_{1i} CPS/GDP_{it-j} + \sum_{j=0}^1 \beta_{2i} ATM_{it-j} + \\
& \sum_{j=0}^1 \beta_{3i} NCB_{it-j} + \sum_{j=0}^1 \beta_{4i} COC_{it-j} + \sum_{j=0}^1 \beta_{5i} RQTY_{it-j} + \sum_{j=0}^1 \beta_{6i} (FI * \\
& RQTY)_{it-j} + v_{it} \dots\dots\dots 7 \\
E(\alpha_{it} \Delta hdi_{it} = 0); & \quad E(\alpha_{it} \Delta x_{it} = 0)
\end{aligned}$$

Equations 6 and 7 are the two interaction models estimated in the study, which examine whether measures of financial inclusion have an effect on measure of living standard more when interacted with institutional quality variables. If the coefficients of the interactive terms are significant, there is an interaction effect between financial inclusion and institutional quality. If they are not significant, then there is no interaction effect between financial inclusion and institutional quality variable. This estimation of the model was split into two; first is the estimation of the financial inclusion, institutional quality and living standard equation with the introduction of control of corruption and its interaction with financial inclusion variable. Second is the estimation of the financial inclusion, regulatory quality and living standard equation and its interaction with financial inclusion variable where the first interaction variable was excluded.

The robust check for the two step system GMM estimation was conducted using the Quantile regression for panel data (QRPD) and the introduction of a new variable – (political stability) - to represent institutional quality. Political stability as a measure of institutional quality has been used by (Ha & Nguyen 2021). The estimation of the quantile regression is to test the reliability of the GMM estimation results, while the introduction of the political stability variable for institutional quality is to check whether this new institutional quality indicator perform well than control of corruption and regulatory quality used in the GMM estimation. The Quantile regression validates and gives credence to the evidence of system GMM results. The quantile regression is a technique that captures conditional distribution instead of conditional mean distribution, as introduced by (Koenker & Bassett, 1978). The study used quantile regression for panel data (QRPD) with 0.25, 0.50, and 0.75 quantiles of financial inclusion indicators to ascertain how human development index reacts to various quantiles of financial inclusion.

4. Results

Table 1 contain the descriptive statistics of the variables used in the study, which indicated that ATM, commercial bank branches and credit to private sector to GDP ratio have observations 751, 725 and 770, while HDI and institutional quality variables have 810 data observations. Human development index which is the proxy for living

standard has a mean of 0.51057 per cent for the entire SSA covering the period 2004-2021.

Table 1: Descriptive Statistics

	Observation	Mean	Maximum	Minimum
<i>HDI</i>	810	0.51057	0.817	0.286
<i>CPS/GDP</i>	751	18.7205	104.849	1.068
<i>ATM</i>	725	11.1029	92.525	0.02
<i>NCB</i>	770	6.1484	55.071	0.043
<i>COC</i>	810	-0.6088	1.6333	-1.63
<i>RQTY</i>	810	0.6561	1.1969	-2.2015

Source: Authors computation

The highest value is 0.817 for Mauritius in 2019, while the minimum value is 0.286 for Niger in 2004. Credit to the private sector as a ratio of GDP has a mean of 18.72 with Congo DR having the smallest performance of 1.0682 in SSA, and Mauritius performed highest with a value of 104.8 in 2013. The overall mean for number of commercial bank branches is 6.1484 in SSA. Congo Republic has the least performance as regards to number of commercial bank branches between 2004 and 2021 with a value of 0.043 branches in 2008, while Seychelles has the highest number of branches in 2019 with a value of 55.071 in SSA. In the number of ATMs per 1000 adults, the mean is 11.1029 for whole SSA; Ethiopia has the lowest with a value of 0.02 in 2004 and 2005, while Seychelles has the highest value of 92.5 in 2021. In terms of institutional quality variables, Equatorial Guinea performed lowest in control of corruption at a value of -1.63 in 2017, while Seychelles performed highest in controlling corruption at a value of 1.633 in 2021. In regulatory quality Mauritius performed better than other countries in SSA for the period 2004-2021 with a value of 1.196 in 2014, while Zimbabwe performed lowest with a value of -2.2015 in 2005.

The correlation matrix of the data and the indicators representing financial inclusion, institutional quality and living standard is presented in Table 2. The results indicate that the regressors used in this study are not highly correlated. A correlation coefficient of up to 80% (0.8) and over is considered high (see Gujarati, 2004). Consequently, there is no incidence of multicollinearity among the regressors in the estimated models, as the highest coefficient is 0.7553 (between *NBB* and *ATM*). Evidently, as shown by the correlation between *COC* and *REQ* (0.8043), these two institutional quality indicators were used in separate regressions and as such do not appear together, as institutional indicators often exhibit high positive correlation (La Porta et al., 2008), resulting in the problem of multicollinearity.

Table 2: The Correlation Matrix

	HDI	ATM	CPS/GDP	NCB	COC	RQTY
HDI	1.0000					
ATM	0.7656	1.0000				
CPS/GDP	0.6455	0.7201	1.0000			
NCB	0.6772	0.7553	0.5229	1.0000		
COC	0.5617	0.6537	0.5928	0.6135	1.0000	
RQTY	0.5629	0.5892	0.6813	0.4212	0.8043	1.0000

Source: Authors computation

In Table 3, the results of the variance inflation factor were provided. As can be observed in Panels A and B indicating the two models estimated respectively, both the VIF and its inverse (i.e. the tolerance level or 1/VIF) indicate that the models do not suffer from multicollinearity, given that for the VIF, its individual value should not be greater than 10 (see Kleinbaum, Kupper & Muller, 1988).

Table 3: Variance Inflation Factor

Variable	Panel A		Panel B	
	VIF	1/VIF	VIF	1/VIF
Hdi(-1)	5.94	0.168447	7.09	0.141053
Coc	5.68	0.176028		
Atm	5.28	0.189465	5.17	0.193313
Cpsgdp	4.43	0.225921	5.55	0.180127
Ncb	3.63	0.275277	3.53	0.283465
Req			5.22	0.191670
Interaction1			2.40	0.415954
Interaction2	3.26	0.307086		
Mean VIF	4.70		4.83	

Note: Panel A: Model in which financial inclusion is interacted with control of corruption; Panel B: Model in which financial inclusion is interacted with and regulatory quality. Source: Authors computation

The two step system GMM results were presented in Panels A and B in table 4 and showing the effect of financial inclusion and interaction with institutional quality on living standard.

The coefficient of 1-lag of HDI in both Panels A and B results is above 0.80 and significant at 5% significant level in the baseline result and the interaction results, implying the persistence in poverty and low level of living standard in SSA. Thus, past living conditions significantly affect the current living standard in SSA. All the results revealed that commercial bank private sector credits as a ratio of GDP has a positive and significant effect on living standard in SSA. In all the results, a unit increase in commercial bank private sector credits lead to an increase in living standard in SSA by about 0.0002 units. This is in agreement with past findings (Ofori-Abebrese, Baidoo & Essiam, 2020; Bakari, Donga, Idi, Hedima, Willson, Babayo & Ibrahim, 2019).

Table 4: Two step system GMM Results

Panel A: Model in which financial inclusion is interacted with control of corruption

Variable	Coefficient	Std. error	p-value
<i>Constant</i>	0.0425***	0.0115	0.001
<i>L.HDI</i>	0.8963***	0.0293	0.000
<i>ATM</i>	0.0002***	0.0001	0.008
<i>CPS/GDP</i>	0.0002**	0.0001	0.012
<i>NCB</i>	0.0006**	0.0002	0.014
<i>COC</i>	-0.0057	0.0047	0.222
<i>COC*FI</i>	-0.0002**	0.0001	0.025
<i>Diagnostics</i>			
AR (1)	z = -1.96 (Pr > z = 0.052)		
AR (2)	z = 1.72 (Pr > z = 0.082)		
Sargan test (OIR)	chi2(18)=17.95; (Prob > chi2= 0.459)		
Hansen test (OIR)	chi2(18)=21.35; (Prob > chi2=0.262)		
Hansen test excluding group	chi2(16)= 21.09;(Prob > chi2= 0.175)		
Difference (null H exogenous)	chi2(2)=0.26;(Prob > chi2= 0.877)		
Hansen test excluding group	chi2(15)= 16.04; (Prob>chi2 = 0.380)		
Difference (null H exogenous)	chi2(3) = 5.31;(Prob > chi2 = 0.150)		
Observations	710		
No of groups	45		
No of instruments	26		
Wald (F-test)	F(6,44) = 31712.59;Prob>F = 0.000		

Panel B: Model in which financial inclusion is interacted with and regulatory quality

Variable	Coefficient	Std. error	p-value
<i>Constant</i>	0.0286**	0.0135	0.039
<i>L.HDI</i>	0.9129***	0.0250	0.000
<i>ATM</i>	0.0003**	0.0001	0.027
<i>CPS/GDP</i>	0.0003***	0.0001	0.000
<i>NCB</i>	0.0006	0.0004	0.134
<i>RQTY</i>	0.0145	0.0145	0.323
<i>RQTY*FI</i>	0.0003***	0.0001	0.013
<i>Diagnostics</i>			
AR (1)	z = -1.94 Pr > z = 0.053		
AR (2)	z = 1.68 Pr > z = 0.094		
Sargan test (OIR)	chi2(18)= 16.9; Prob > chi2 = 0.528		
Hansen test (OIR)	chi2(18)= 21.08; Prob > chi2 = 0.275		
Hansen test excluding group	chi2(16)= 19.86; Prob > chi2 = 0.226		
Difference (null H exogenous)	chi2(2)= 1.21; Prob > chi2 = 0.545		
Hansen test excluding group	chi2(15)= 17.49; Prob > chi2 = 0.290		
Difference (null H exogenous)	chi2(3) = 3.59; Prob > chi2 = 0.309		
Observations	710		
No of groups	45		
No of instruments	26		
Wald (F-test)	F(6, 44) =26458.80, Prob>F = 0.000		

Note: *** and ** significant at 1% and 5% respectively. Source: Authors' computation

Control of corruption has a negative but insignificant effect on living standard in SSA. However, when it interacted with financial inclusion variable, the interaction had a significant negative effect on living standard. Thus, an increase in financial inclusion

combined with higher control of corruption has a negative effect on living standard by 0.0002117 units in SSA as shown in Panel A of table 4. This implies that poor control of corruption undermine the positive effect that financial inclusion has on living standard in SSA, resulting to decrease in living standard. However, this result does not agree with that of Mohammed (2021) who found that remittance and corruption has a positive effect on human development.

Panel B of Table 4, regulatory quality has a positive but insignificant effect on living standard in SSA. When it interacted with financial inclusion variable, the interaction has a significant positive effect on living standard. An increase in financial inclusion combined with higher regulatory quality caused a positive marginal increase in living standard by 0.0003448 units in SSA. However, control of corruption and regulatory quality individually do not have a significant effect on living standard, the outcome of the interaction variables means that financial inclusion is contributing to the effect on living standard in SSA. A clearer view is observed from the coefficients of the interaction terms from both Panels A and B, which are not larger than the individual financial inclusion variables that have significant effect on living standard in the results. This could imply that control of corruption though relating negatively with living standard and regulatory quality having positive relationship with living standard have no strong effect on living standard in most SSA countries. Only countries in SSA with strong institutional quality could experience remarkable effect of financial inclusion on living standard as shown by the interaction variables. Studies with findings revealing the interaction effect of financial inclusion and institutional quality on economic outcomes include Yiadom, Dziwornu and Yalley (2021), Nambie and Obobi (2022). Moreover, the coefficient of the interaction terms indicate that regulatory quality matters more in examining the effect of financial inclusion on living standard in SSA.

The diagnostic tests indicate that the AR tests that was used for serial correlation of the data and estimation results were satisfactory. Particularly, second order AR test is not statistically significant, and thus, failed to reject the hypothesis of no autocorrelation. In addition, the Sargan and Hansen tests for over identification restrictions were not significant, implying that the instruments used are valid or not correlated with the error terms. Though the Sargan OIR test is not robust and not weakened by instruments, the Hansen OIR is robust but weakened by instruments. Moreover, in order to validate the Sargan and Hansen OIR tests, Difference in Hansen test for exogeneity of instruments was employed, and the outcomes failed to reject the hypothesis that the entire instruments as a group are exogenous. The probability of the Wald chi-square test for the three results is 0.0000, implying that the joint estimated coefficients are significant.

The study estimated quantile regression for panel data with the introduction of political stability as an institutional quality variable interacting with financial inclusion to validate results of the system GMM and that of the institutional quality variables. The result of the 25th quantile of living standard distribution represents low HDI, the 50th quantile of living standard distribution represents medium HDI while 75th quantile showing high HDI as presented in appendix 2. The coefficients of the 25th, 50th and 75th quantile of the QRPD revealed that there is no clear distributional effect of financial inclusion variables, institutional quality variables and their interaction on the different levels of living standard (proxied by HDI) in SSA countries. Most of the variables in the QRPD are significant as in the system GMM, which validate the evidence from the system GMM result; the exception is the interaction variable that is statistically significant with a negative effect. This implies that lack of political stability experienced in most SSA countries is adversely influencing the effect of financial inclusion in improving living standard.

5. Conclusion and Recommendations

The paper examined the interaction effect of financial inclusion and institutional quality on living standard in Sub-Saharan Africa from 2004 to 2021. The study analyzed the objective employing the two-step system Generalized Method of Moments. It also employed the Quantile regression for panel data to validate the system GMM result and test the distributional effect of financial inclusion variables on different levels of human development index in SSA.

The study concludes that control of corruption interacts with financial inclusion (number of ATMs) to have a significant negative effect on living standard in SSA. In addition, regulatory quality interacts with financial inclusion (number of ATMs) to influence living standard positively in SSA. The study therefore, concludes that if strong institutional quality is enshrined in SSA, it will amplify the effect of financial inclusion on the economy of countries in the region. This will go a long way in improving the living standard in the region.

Furthermore, the findings on the interaction terms and that of other predictors established the fact that control of corruption and regulatory quality play marginal major roles in ensuring that financial inclusion improves living standard in Sub-Saharan Africa. Thus, this study recommends that different economies in Sub-Saharan Africa should bolster their institutional and regulatory infrastructures, ensuring their resilience against government interference. This will help in ensuring that strong regulations are enshrine in financial inclusion policies where bottlenecks and costs of transactions from the financial institutions are removed or reduced to a minimum level. It will also ensure

that everyone could be able to access and use the financial institutions and their products.

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