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ANALYSIS OF THE IMPACT OF FINANCIAL USAGE ON POVERTY IN WEST AFRICAN COUNTRIES

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ABSTRACT

This study analyzes the impact of financial usage on poverty in 15 developing countries in West Africa from 2010 to 2020. Utilizing a composite financial usage index constructed through Principal Component Analysis (PCA), the analysis employs the Generalized Method of Moments (GMM) and Dumetriscu and Hurlin panel causality tests to explore the relationship between financial usage and poverty levels in the region. The findings of this study reveal that financial usage, specifically through ATMs, does not have a significant influence on poverty reduction across the examined countries. The result challenges the assumption that merely increasing access to financial services will directly translate into improved economic conditions for the poor. Moreover, the study finds no evidence of a causal relationship running from financial usage to poverty. This lack of causality suggests that while financial services are essential, their mere availability does not guarantee that individuals will utilize them effectively to improve their financial situations. One key recommendation is to increase domestic credit provided by the private sector. Access to credit can empower individuals and small businesses to invest in income-generating activities, thereby facilitating economic growth and improving living standards. By providing the necessary financial resources, stakeholders can help create an environment where entrepreneurship flourishes, leading to job creation and economic stability.

Keywords: Financial inclusion, financial usage, ATM, poverty, West Africa, GMM.

1. INTRODUCTION

Financial inclusion has been one of the primary challenges gaining the attention of governments, the private sector, and development agencies in recent years. Financial inclusion is defined as the percentage of individuals and businesses who have access to and use financial services provided by formal financial institutions. An inclusive financial system aids in the reduction of extreme poverty, the expansion of shared prosperity, and the promotion of inclusive and sustainable development (World Bank, 2014). It also promotes effective resource allocation, increases people's efficiency and well-being by encouraging saving habits, and restricts the rise of exploitative informal loan sources. The primary goal of financial inclusion is to provide access to a wide range of financial services such as credit, savings, insurance, and money transfers through a variety of financial institutions, allowing the poor and low-income people to improve their living conditions and escape poverty.

Poverty remains a pressing issue in West Africa, where a significant portion of the population lives below the poverty line. Financial services, particularly those that enhance accessibility and usage, are often seen as vital tools for alleviating poverty. Financial usage is a key in boosting economic growth and decreasing poverty and inequality. This was demonstrated by the designation of 2005 as the International Year of Microcredit (the

simplest and most effective manner of delivering financial services to the poor). Furthermore, the United Nations Development Programme (UNDP) launched an initiative, in 2009, to increase financial inclusion among the poor by providing appropriate financial products and services to meet their requirements. The desire to improve access to finance in Nigeria prompted the creation of the first National Financial Inclusion Strategy (NFIS) in 2012. This is due to the need to increase credit availability through the promotion of savings and investment, as well as to bring more adults into the financial system. A formal financial system. Targets were set to improve financial inclusion by enhancing access to financial services, boosting usage, and providing cheap and acceptable products to all sectors of society.

The developing world, including Africa, South and Central America, the Middle East, and South Asia, has been hit the worst, with more than half of the population impacted (Alkire et al., 2015). In the absence of formal access, the unbanked poor, including those in West Africa, resort to informal means of saving their funds, such as in their houses and under their beds, with risks of theft and unplanned spending, while some patronise "loan sharks" for lending needs that are grossly inadequate, leaving the excluded people financially and economically disadvantaged. Also, lack of access of the poor to financial services deny them the empowerment needed to lift themselves out of poverty given that the financial system is the life blood of commerce and business (Alkire et al., 2015). The study will look at whether financial inclusion (financial usage) may lead to poverty reduction in West Africa, as well as whether there is an interaction impact between the two elements.

2. LITERATURE REVIEW

2.1 Theoretical Framework

The origin of the finance-growth theory can be traced back to Bagehot (1873). The proponents of the finance-growth theory argued that the existence of an energetic financial sector has growth-enhancing effects. Schumpeter (1911) posited that banks enable an economy to grow by providing efficient markets for funds. Goldsmith (1969), McKinnon (1973), Levine and Zervos (1996) and Ndebbio (2004), among others, also emphasized the positive role of financial systems in economic growth. The finance-growth theory looked at the lack of access to finance as a critical factor responsible for persistent income inequality as well as slower growth. It posits that financial development creates a productive environment for growth through “supply leading” or “demand-following” effect. Consequently, access to safe, easy and affordable source of finance is recognized as a pre-condition for accelerating growth and reducing income disparities and poverty, which creates equal opportunities, enables economically and socially excluded people to integrate better into the economy and actively contribute to development and protect themselves against economic shocks (Serrao, 2012). Furthermore, the main argument of proponents of the supply leading theory was that financial markets evolve in response to increased demands for financial services from an already budding economy and as such, the development of financial markets should be a reflection of growth in other sectors of the economy.

2.2 Empirical Review

Numerous extant studies show that access to financial services has a significant effect on input use and the productivity (Lang et al., 2024; Inoue, 2024). The findings of these studies similar to previous studies, which revealed that the decision by household farmers to invest in farming is significantly affected by their access to financial services (Zhang, Tadesse, and Huang, 2024; Masuku, Raufu & Malinga, 2015). Lang et al. (2024) found a significant negative association between financial literacy and the likelihood of falling into poverty. Their causal analysis further confirms that financial literacy has a detrimental effect on poverty levels, with results consistent across various sub-samples. Inoue (2024) utilized panel data from 2000 to 2020 across 123 countries, employing dynamic generalized method of moments estimation. The study revealed that direct foreign investment (DFI) and remittance inflows play crucial roles in alleviating poverty in developing nations. Notably, the interaction term between DFI and remittances was statistically significant and positive, indicating that the effectiveness of DFI in reducing poverty may weaken as remittance inflows increase in recipient countries, and vice versa.

Zhang, Tadesse, and Huang (2024) examined the interplay between financial usage, financial literacy, and financial well-being in China, using 2019 Household Finance Survey data. They found a positive correlation between financial usage and improved financial well-being, with financial literacy acting as both a mediator and moderator in this relationship. The study underscores the importance of financial literacy in enhancing household per capita income and balancing income and expenditures. However, low-income households demonstrate lower levels of financial usage and financial literacy compared to their higher-income counterparts.

Akpa, Osabohein, Ashraf and Al-Faryan (2023) investigated the financial inclusion and post-harvest losses in West African economic and monetary union using the data from Banque Centrale des Etats de l’Ouest (BCEAO) for financial inclusion over the period 2000 – 2020. The study applied the instrumental variable two-stage least squares (IV-2SLS) and generalised method of

moments (GMM) to test the robustness of the results. The study results shows that financial inclusion reduces post-harvest losses by 1.2%. Therefore, given this result, policies to improve farmers' access to credit by increasing the rate of financial inclusion, is a necessary condition for the reduction of post-harvest losses. Coulibaly and Yogo (2020) investigated the job creation and decent work in Oyo State, Nigeria using a multi-stage random sampling technique and administered 376 questionnaires to N-Power program beneficiaries; this was supported by two-focused group discussion. Results show that the social investment programs (SIP) addressed the issue of unemployment but the job cannot be termed decent because of lack of job security, right of work and social dialogue. The study, therefore, recommends that the conditions of engaging graduates should be reviewed in terms of salary structure and period of engagement. There could be the inclusion of some basic rights at work during their engagement and the tenure should be increased from two to three years with the option of engaging some of the beneficiaries as full-term staff at the Federal and State level based on specific criteria that the beneficiaries will meet.

Gunarsih, Sayekti and Dawanti (2018) examined the role of financial inclusion in reducing the poverty alleviation using an annual time series data range from 2012 – 2017. The study reported that increase access to financial services has significant impact on poverty alleviation, but the impact is more pronounce in the urban areas than the rural areas because of the concentration of the financial services providers in the urban centres. Harley, Adegoke and Adegbola (2017) examined the role of financial inclusion in economic growth and poverty reduction in a developing economy using panel data analysis ranges from 2006 to 2015 within a log linear model specification framework. The methodology applied to the study is distilled from the literatures.

The result of the study indicates that records of active ATM, bank branches and government expenditures selected from three African countries were the most robust predictors for financial inclusion on poverty reduction in a developing economy. The study also indicates that most of the ATM in developing economy are outdated and thus required a technological upgrade to have a significant impact in rural areas. Oumarou and Celestin (2021) analysed the determinants of financial inclusion proposes an instrument of measuring financial inclusion in West African Economic and Monetary Union (WAEMU) countries. The study needs for an accurate way to assess financial inclusion in the WAEMU zone is imperative because a set of indicators has been adopted within the regional financial inclusion strategy by the Central bank of West African states (CBWAS).

The study panel regressions reveal that real GDP, mobile phone penetration, and literacy rate have a positive effect on financial inclusion. Conversely, the weight of the rural population and interbank credit is negatively associated with the level of financial inclusion. Agricultural financing via the credit channel that banks grant to the government is likely to increase financial inclusion. We also find a positive impact of rural-oriented literacy on financial inclusion.

2.3 Gap Identified in the Literature

To be sure, the existing literature on finance and poverty has a bias towards credit access. However, for the poor, access to financial services and poverty are often not priorities because they are more concerned with other important welfare issues, such as consumption smoothing and cushioning from adverse income shocks. As a result, the importance of broad access to financial services on the lives of the poor and agricultural output must be considered. However, most studies (Akpa, Osabohein, Ashraf and Al-Faryan, 2023; Agbenyo, Jiang and Antony, 2019) attempting to examine broad financial services frequently employ proxy measures such as Distance to financial institutions and long-term asset ownership are two examples. Such an approach focuses solely on the poor, rather than the financially excluded population. However, improving access to finance for all excluded societal members, not just the poor, has emerged as a key policy goal in both developed and developing economies.

3. METHODOLOGY

3.1 Source of Data

This study used secondary panel dataset covering the period from 2011 to 2020 in estimating the impact of financial usage on poverty in selected West African countries. These countries are selected on the basis of data availability. The countries are Benin Republic, Burkina Faso, Cape Verde, Gambia The, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Liberia, Mali, Niger, Nigeria, Senegal, Sierra León, and Togo. However, the data were sourced from World Development Indicators (WDI, 2024) database.

3.2 Model Specification

This study adopted the model from the works of Muhammad et al. (2023), Bekun and Akadiri (2019), and Bakari (2019) with some modifications to meet the predetermined objectives of this study. However, the choice of the variables captured in the model is guided by the theoretical and empirical evidences. The specification is on the impact of financial usage on poverty. Thus, the functional models specified as:

$POV = f(ATM, DCPS, DCBS, CBB)$ …… (3.1)

Furthermore, the econometric models of the functional specification above are given as:

$POV_{it} = \beta_0 + \beta_1 ATM_{it} + \beta_2 CBB_{it} + \beta_3 DCPS_{it} + \beta_4 DCBS + \mu_{it}$ …… (3.2)

Where POV = Poverty
ATM = Automated Tellers' Machine,
DCPS = Domestic Credit to Private Sector,
DCBS = Domestic Credit by the Banking Sector,
CBB = Commercial Bank Branches,
μ = Error term or white noise,
i = sampled countries,
t = Time period
$\beta_0 - \beta_4$ = Coefficients of the estimated parameters.

3.3 Measurement of Variables

Poverty is the dependent variable, whereas the independent variables include financial inclusion components such as automated tellers' machines, domestic credit to the private sector, domestic credit by the banking sector, and commercial bank branches. These components are used to assess financial inclusion in terms of financial usage, availability, and accessibility. This study used four explanatory variables as indicators of financial usage. These are automated tellers' machine, domestic credits to private sector, domestic credit by banking sector and commercial bank branches. Poverty is a vast concept and can exist in various forms. However, in this study final consumption expenditure (% of GDP) is used as a proxy for poverty as it considers multidimensional aspects of poverty like health, education and social services. This is in line with the measurement by World Bank (2021).

Automated Tellers' Machine is measured as the number of ATMs per 100,000 adults. Furthermore, this indicator reflected the attribute of financial inclusion from the usage dimension. This is in accordance with the works of Harley, Adegoke and Adegbola (2017). Domestic credit to private sector is measured as financial resources provided to the private sector by financial institution or cooperations. Thus, the indicator represents financial inclusion from the availability dimension. This is according to the work of Sarma (2008). Domestic credit by banking sector is measured as domestic credit provided by the financial sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The financial sector includes monetary authorities and deposit money banks, as well as other financial corporations.

The indicator also captured availability aspect of financial inclusion. This is accordance with measurement of World Bank (2020) and International Monetary Fund (2020). Commercial bank branches measured as Commercial bank branches per 100,000 adults. In addition, it represents retail locations of resident commercial banks and other resident banks that function as commercial banks that provide financial services to customers and are physically separated from the main office but not organized as legally separated subsidiaries. This also represents accessibility aspect of financial inclusion. This is in line with measurement of World Bank (2020) and International Monetary Fund (2020).

3.4 Estimation Strategy

The study employs panel data techniques to estimate the variables under investigation in order to examine the impact of financial usage on poverty in West Africa. In the light of the above, the series were put through the following pre-estimation tests (i.e. cross-sectional dependence (CD) tests, panel unit root tests and panel cointegration tests) in order to identify appropriate panel data estimation techniques for the analysis. This estimation strategy employed for this study encompasses several key steps for carrying-out panel data analysis. The first step is to test for CD using Breusch-Pagan LM and Pesaran (2004) CD tests. If the results indicate the absence of CD among West African countries, the study employed first generation panel unit root tests to examine the stationarity of the variables. If, however, the result indicates the existence of CD among the cross-sectional units, the study used second generation panel unit root tests to examine the stationarity of the variables, such as Bain and Ng test and Pesaran's CIPS tests.

After establishing the integration order of the variables, the subsequent stage involves examining panel cointegration through Pedroni and Kao cointegration approaches. This is to determine if a long-run relationship exists between the variables in cross-sectionally dependent panel data. Since, the result shows evidence of cross-sectional dependency, integration as well as cointegration among the variables, the study used Generalized Method of Moments (GMM) estimate developed by Holtz-Eakin, Newey, and Rosen (1988); Arellano and Bond (1991); Arellano and Bover (1995); and Blundell and Bond (1998) to estimate the variables under investigation. Thus, the difference GMM model is specifies as:

$$lnY_{it} = \phi lnY_{it-1} + YZ'_{it} + \beta X'_{it} + d_t + \varepsilon_{it} \quad \text{…… (3.3)}$$

Where: Z': Implies control variables, X′: Implies explanatory variables, lnY_{it-1} : is lagged value of dependent variable. The system GMM used the difference GMM model and first difference of the equation (1) as instruments. Thus, the system GMM and its instrumental equation are expressed as:

$$lnY_{it} = \phi lnY_{it-1} + YZ'_{it} + \beta X'_{it} + d_t + \varepsilon_{it} \quad \text{…… (3.4)}$$

$$i = 1,2,\dots,N; t = 1,2,\dots,T$$

$$\Delta \ln Y_{it} = \Delta \ln Y_{it-1} + \Delta Z_{it} + \Delta X_{it} + \Delta \varepsilon_{it} \quad \text{…… (3.5)}$$

Hence, the expressions (2) and (3) implied that system GMM used more instrument than the difference GMM. However, the above GMM model noted that if the dependent variable is close to random walk for instance ($\phi -> 1$) that is the lagged dependent variable is moving toward one (1). The Difference GMM estimation will not yield a robust estimate rather a biased and inefficient estimate and consequently could be acute when the time panel is short (Blundell & Bond, 1998). However, in addition to the difference GMM, the system GMM model was developed and it is preferred in most respect as the estimator captures the persistent nature of regressors on the dependent variable which also addresses the problems of measurement error, endogeneity, country-specific and heterogeneity (Adeleye, Osabuohien & Bowale, 2017).

The system-GMM estimator would be assessed by two specification tests. The Hansen test of over-identifying restrictions tests for the overall validity of the instruments; and the Arellano Bond test which examines that the error term is not serially correlated would be employed. Failure to reject both null hypotheses give support to the model (Arellano & Bond 1991; Arellano & Bover, 1995; Blundell & Bond, 1998). This study is directed by Bond's (2001) statements in order to identify the right models between difference GMM and system GMM. Bond (2001) observes that if the coefficient of the difference GMM estimation is lower or very close to the coefficient of the fixed effect estimation, the result indicates that the difference GMM is downward biased owing to poor instrumentation and that the system GMM should be employed instead. Finally, the study will determine causality between variables using panel Granger causality approach developed by Dumitrescu and Hurlin (2012).

4. DATA PRESENTATION AND ANALYSIS

4.1 Descriptive Statistics

The results of descriptive statistic of the variables used in the estimation are presented in table 4.1. Table 4.1 shows that, the mean of poverty, automated teller machines, domestic credit to private sector, domestic credit by banking sector and commercial bank branches are positive. This explains that the variables recorded positive growth rate over the sample period. However, from the estimation, the result attested that, automated teller machines have the highest standard deviation of 1.13, which indicate that, the variable fluctuates more than any variable in the distribution. However, poverty has the lowest standard deviation of 0.09, which shows that, the variable is less volatile compared to others in the model.

Table 4.1: Summary Statistics of Variables

Statistic	LPOV	LATM	LDCPS	LDCBS	LCBB	
Mean	4.4787	1.5150	3.0870	3.3616	1.5150	
Median	4.4650	1.5818	2.8079	3.2835	1.5271	
Maximum	4.7573	3.9525	6.4320	4.4538	3.5307	
Minimum	4.2020	-1.2463	1.5623	2.4890	0.2231	
Std. Dev.	0.0992	1.1275	1.1066	0.4220	0.7036	
Skewness	0.4251	-0.2863	1.5605	0.8601	1.2346	
Kurtosis	3.3172	3.8119	5.6319	3.9045	5.0358	
Jarque-Bera	4.8055	5.7582	97.2281	22.0371	59.7479	
Probability	0.0904	0.0561	0.0000	0.0000	0.0000	
Observations	140	140	140	140	140	

Source: *Author's computation using Eviews 8.0 (2023).*

Furthermore, the results show that all the variables positively skewed except automated teller machines, which proposes that majority of the distribution in these variables are concentrated to the right of the distribution. The results also attested that; all the variables have excess kurtosis greater than 3.00. This is showing that the distribution of all the variables is leptokurtic in nature and exhibit fat tail (thick-tail). The Jarque-Bera coefficients of all the variables indicate that the series are not normally distributed except poverty and automated teller machines. This is reflected to the fact that the probability values of all the variables in the model are less than 5% level of significant while that of poverty and automated teller machines is greater than 5%.

4.2 Cross-Section Dependency Test

Table 4.2: Results of Cross-Section Dependency Test

Breusch-Pagan LM	145.0985	0.0003
Pesaran scaled LM	4.010044	0.0001
Pesaran CD	1.002315	0.3162

Source: ***Author's computation using Eviews 8.0 (2023).***

From the results presented in table 4.2 the results from the model that capture the influence of financial inclusion on poverty reduction show that two out of three approaches indicate the presence of cross-section dependence in residual at 1% level of significance, while the pesaran CD test show no presence of cross-section dependence among the series even at 10% level of

significance. Thus, based on the results, this study concludes that there is presence of cross-section dependence among the variables. Based on the foregoing tests in all the two model, the results attested that there is presence of cross-section dependence among the variables. Therefore, the first-generation unit root tests approaches are not appropriate in testing the behavior of the variables and second-generation unit root test approaches are appropriate. Thus, the tests are conducted and the results are presented in table 4.3.

4.3 Results of Unit Root Tests for Cross-Sectionally Dependent Panels

This subsection contains the results of unit root tests from Bain and Ng-PANIC and CIPS testing approaches. The results are summarized and tabulated in table 4.3.

Table 4.3: Results of Unit Root Test

Variables	Bain and Ng-PANIC test		CIPS test	
	Constant	Constant and Trend	Constant	Constant and Trend
LPOV	2.7806***	-0.96721	-3.7526***	-2.40130
LATM	0.3034	2.9456***	-12.6099***	-6.0361***
LDCPS	0.5017	0.7216	-3.0243***	-4.3465***
LDCBS	2.8933***	5.6782***	-3.3600***	-5.4498***
LCBB	1.2513	-1.0237	-9.1417***	-26.8681***

Note: ***, ** and * indicate significance at 1%, 5% and 10% respectively.

Source: ***Author's computation using Eviews 8.0 (2023).***

This study conducted a cross-sectionally dependent panels unit root test using Bain and Ng, and CIPS testing approaches. From the Bain and Ng test the results show that automated teller machines are stationary at constant and trend while poverty and domestic credit by banking sector are stationary at constant. However, domestic credit to private sector and commercial bank branches are not stationary either at constant or constant and trend. From the CIPS test, the results show that automated teller machines, domestic credit to private sector and domestic credit by banking sector and commercial bank branches are stationary at both constant and constant and trend. On the other hand, the CIPS test shows that poverty is stationary at constant.

4.4 Panel Cointegration Tests

Based on the findings of the panel unit root tests, it is possible to run panel cointegration tests to determine the existence or absence of cointegration. This study used Kao and Pedroni panel cointegration tests to supplement the procedure, and the findings are shown in table 4.4. Table 4.4 shows that there is evidence of cointegration among the variables. This is due to the fact that the t-statistic coefficients in both models are statistically significant at the 10% and 5% levels. As a result, the null hypotheses are rejected, and we infer that the variables are cointegrated. This study however, used the Pedroni cointegration test to confirm the Kao cointegration test. The Pedroni panel cointegration test results are shown in table 4.4. The findings indicate that there is evidence of cointegration among the variables. Although, several tests in both models, such as Panel v-Statistics, Panel Rho-Statistics, and Group Rho-Statistics, are not statistically significant even at 10% level. Nonetheless, the null hypothesis of no cointegration cannot be accepted for the vast majority of tests. This is reflected to the fact that majority of the statistics are statistically significant at 1%, 5% and 10% levels. According to Pedroni (2004), the panel ADF and group ADF tests have superior small sample qualities than the other tests and hence provide statistically significant test findings at the 1%, 5% and 10% levels. Based on the test results, this study concludes that there is evidence of cointegration among the variables.

Table 4.5: Pedroni Panel Cointegration Test

Test	Statistics	P-value
Within-Dimension		
Panel v-Statistic	-0.2703	0.6066
Panel rho-Statistic	3.4965	0.9998
Panel PP-Statistic	-17.6023	0.0000***
Panel ADF-Statistic	-6.0358	0.0000***
Between-Dimension		
Group rho-Statistic	5.2321	1.0000
Group PP-Statistic	-17.2041	0.0000***
Group ADF-Statistic	-2.2845	0.0112**
Kao Residual Cointegration Test Results		
Kao t-Statistic	P-value	
-2.0396	0.0207**	

Note: *, ** and * indicating significant at 1%, 5% and 10% levels.***

Source: ***Author's computation using Eviews 8.0 (2023).***

4.5 Correlation Analysis of the Models

Prior to the regression analysis, it is important to know the correlation coefficient of the variables. This is because understanding the nature of correlation coefficient will guide in deciding the variables that will be included in the model. Correlation analysis also serves as diagnostic test for checking the presence of multicollinearity. Thus, the results of the test are reported in table 4.5. The correlation coefficient of the variables must be known prior to the estimation of regression analysis. This is due to the fact that understanding the nature of the correlation coefficient will help in determining which variables to be included in the model. Correlation analysis may also be used to check for the presence of multicollinearity. As a result, the test results are presented in table 4.5.

Table 4.5: Correlation Coefficients of the Models

Variables	LPOV	LATM	LDCPS	LDCBS	LCBB
LPOV	1.0000				
LATM	-0.5946	1.0000			
LDCPS	-0.2195	0.3581	1.0000		
LDCBS	-0.2749	0.3007	0.3681	1.0000	
LCBB	-0.2867	0.1065	0.3488	0.4270	1.0000

Source: ***Author's computation using Eviews 8.0 (2023).***

However, from the link between financial inclusion and poverty reduction, the findings show that, automated teller machines, domestic credit to the private sector, domestic credit by banking sector, and commercial bank branches are all inversely connected with poverty, with correlation coefficients of -0.5946, -0.2195, -0.2749 and -0.2867 respectively. The results suggest that concentrating more on financial inclusion components such as automated teller machines, domestic credit to the private sector domestic, credit by banking sector, and commercial bank branches is strongly associated with poverty reduction in the sampled African economies. Hence, according to the findings, there is no presence of multicollinearity among the variables, and the variables are well suited to be included in the models for analysis.

4.6 Results of Generalized Method of Moment (GMM) Regression

The results of impact of financial inclusion on poverty reduction in the sampled West African countries are shown in table 4.6.

Table 4.6: Financial Inclusion and Poverty Reduction

Dependent Variable: Poverty reduction						
Difference GMM Regression				**System GMM Regression**		
Variables	Coef.	St. Error	P-val.	Coef.	St. Error	P-val.
LPOV (-1)	0.1543	0.0322	0.0000	0.2748	0.0335	0.0000
LATM	0.0484	0.0372	0.1964	-0.0014	0.0274	0.9566
LDCPS	-0.0522	0.0161	0.0016	-0.0330	0.0198	0.0991
LDCBS	-0.0904	0.0147	0.0000	-0.0182	0.0265	0.4929
LCBB	-0.0596	0.0316	0.0620	-0.1485	0.0470	0.0021
PLS coef. = 0.6472, FE coef. = 0.2609, AR (1) = -1.2640 (0.2062), AR (2) = 0.8578 (0.3910), J-Sta.1 = 12.1502 (0.2049) and J-sta.2 = 10.5351 (0.3089)						
Note: PLS = Panel Least Square, FE = Fixed Effect, AR = Autocorrelation and J-Sta. = Sagan Test.1 for model 1., and J-Sta. = Sagan Test.2 for model 2.						
Source: ***Author's computation using Eviews 8.0 (2023).***						

In table 4.6, the results show that system Generalized Method of Moment (GMM) is more appropriate. This is because the coefficient of lag value (0.1543) of the dependent variable (poverty) from the difference GMM is less than the coefficient of the fixed effect regression. Thus, the results suggest that difference GMM is downward biased and the system GMM should be used. Hence, for the sake of comparison, results obtained using difference GMM is also reported. Based on the explanation above, this study will only interpret the results of system GMM regression. According to the results reported that previous value (lag value) of poverty has significant positive effect on the present poverty at 1% level. An increase in previous poverty by 1% will lead to rise the rate of poverty by about 0.27% over the sampled period. The results reported in table 4.8 show that there is negative and statistically insignificant relationship between automated teller machines and poverty even at 10% level. An increase (decrease) in

automated teller machine will lead to decrease (increase) the level of poverty in the sampled African countries. Thus, the result is not statistically and hence automated teller machines do not influence poverty in the selected African economies over the study period.

Additionally, the results show that there is negative and statistically significant relationship between domestic credit to private sector and poverty in the sampled African countries at 10% level. An increase or decrease in domestic credit to private sector will decrease or increase poverty. This implies that when domestic credit to private sector increases by 1%, poverty will reduce by at least 0.03% and vice versa. This implies that domestic credit to private sector is the most important component of financial inclusion and pumping more money to private sector will create many opportunities such as employment generation, revenue to the government at all level and in the long run it will reduce the sharpness of poverty in the sampled African countries. Furthermore, the results indicated that there is negative and statistically insignificant nexus between domestic credit by banking sector and poverty reduction in the sampled economies. A rise or decline in domestic credit by banking sector will lead to increase or decrease the rate of poverty in the selected countries. It implies further that when domestic credit by banking sector rises by 1%, the rate of poverty will decrease by almost 0.02%. Hence, the result is not statistically significant and this implies that domestic credit by banking sector does not have any significant influence on poverty reduction in sampled African economies.

Additionally, the results indicate that commercial bank branches have significant negative influence on poverty at 1% level. This implies that an increase or decrease in commercial bank branches will lead to decrease or increase the rate of poverty over the sampled period. Moreover, when commercial bank branches rise by 1%, the rate of poverty in the sampled area will decline by almost 0.14%. This is this as expected because establishment of bank branches will crease employment opportunities to the residents and thus reduce the rate of poverty overtime. The result also attested that commercial bank branches is one of the most important aspects of financial inclusion is the study area. Lastly, to validate the results, this study conducted the diagnostic tests using Arellano-Bond Serial Correlation Test and Sargan (J-Statistics) test. Thus, both the tests indicated that the model is free from serial correlation and model is not over identified. This because the probability values of the two tests are not statistically significant even at 10% level.

4.7 Results of Panel Causality Tests

The main objective of conducting a causality test is to evaluate the nature and direction of the causative relationship between the dependent variable (poverty) and a collection of independent variables (automated tellers' machine, domestic credit to private sector, domestic credit by the banking sector and commercial banks branches). Table; 4.7 present the panel causality test results.

Table 4.7: Panel Causality Test

Null Hypothesis:	W-Stat.	Zb-Stat.	Prob.
LATM does not homogeneously cause LPOV	1.35401	-0.16285	0.8706
LPOV does not homogeneously cause LATM	1.91981	0.46831	0.6396
LDCPS does not homogeneously cause LPOV	1.85513	0.39616	0.6920
LPOV does not homogeneously cause LDCPS	1.09432	-0.45255	0.6509
LDCBS does not homogeneously cause LPOV	1.04112	-0.51190	0.6087
LPOV does not homogeneously cause LDCBS	2.08753	0.65541	0.5122
LCBB does not homogeneously cause LPOV	1.15682	-0.38283	0.7018
LPOV does not homogeneously cause LCBB	3.09229	1.77627	0.0757

Source: *Author's computation using Eviews 8.0 (2023).*

According to table 4.7, there is no evidence of causality runs from automated tellers' machine to poverty or from poverty to automated tellers' machine. Because the probability values of W-statistic and Zber-statistic are not statistically significant even at the 10% level, the null hypothesis must be accepted. According to the findings, automated tellers' machine cannot be used to forecast the level of poverty and vice versa in the sampled African countries. Also, the findings show significant no evidence of causality running from domestic credit to private sector to poverty. This is because the test's probability value is not statistically significant at the 10% level. As a result, the null hypothesis is accepted.

This also indicates that the domestic credit to private sector may be used to forecast the poverty rate in Africa. Also, the test findings indicates that there is no evidence of causality between domestic credit by banking sector and poverty even at the 10% level. The findings specify that the null hypothesis that domestic credit by the banking sector does not homogeneously cause poverty

rate and vice versa can be accepted and reject the alternative hypothesis. Finally, the test findings indicated that there is evidence of significant unidirectional causality running from poverty to commercial bank branches at the 10% level. The findings specify that the null hypothesis that poverty does not homogeneously cause commercial bank branches will be accepted.

5. CONCLUSION AND RECOMMENDATIONS

On the basis of the findings of this study, the following conclusion is drawn. Firstly, financial inclusion measured using accessibility has a significant positive impact on poverty reduction. Secondly, financial inclusion using usage dimension has no significant impact on poverty reduction and lastly, financial inclusion measured by accessibility and availability are the most important components of financial inclusion, which have an influence on poverty reduction. The following recommendation are put forward:

i. This study recommends the need to make these financial services more available by providing a lot of banking outlets that are easily accessible for all, as most of the excluded people live in rural areas. There is need for more banks that are within the reach of the rural people and by making financial services more easy and cheaper to acquire will encourage the people to make use of financial service by improving the technology improvement which will enhance effective, efficient and sufficient channel of financial services this will lead to improvement in the financial services of the sample countries.

ii. From the causality test, the findings shows that there is evidence of unidirectional causality between financial accessibility to poverty. This study suggests the need for government (Federal, State and Local Governments) in the sampled countries to re-design, formulate and implement strategies that will aim at creating effective and regulatory provision of financial intermediation services, innovation for the economy and effective implementation of the above options will increase the level of financial inclusion on poverty in the sampled countries.

iii. The study recommends a multifaceted approach to enhance poverty reduction efforts in West Africa. One key recommendation is to increase domestic credit provided by the private sector. Access to credit can empower individuals and small businesses to invest in income-generating activities, thereby facilitating economic growth and improving living standards. By providing the necessary financial resources, stakeholders can help create an environment where entrepreneurship flourishes, leading to job creation and economic stability. In addition, the study emphasizes the need for relevant stakeholders to focus on increasing the number of banks and financial institutions, particularly in underserved areas. Expanding the banking network can enhance financial accessibility and encourage more individuals to engage with formal financial services. This increase in banking presence can also contribute to creating employment opportunities, which are critical for reducing poverty rates in the region.

iv. Furthermore, enhancing financial literacy among the population is essential. Programs aimed at educating individuals about financial management, saving, and investing can empower them to make informed decisions. This knowledge can lead to more effective utilization of available financial services and foster a culture of savings and investment. In conclusion, while the study highlights that financial usage, as measured by ATM availability, does not significantly influence poverty levels in West Africa, it underscores the importance of a broader approach to financial inclusion.

To effectively combat poverty, strategies should focus on enhancing credit access, expanding the banking network, and improving financial literacy. By addressing these areas, West African countries can create a more conducive environment for economic growth and poverty reduction, ultimately leading to improved living standards for their populations.

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