

Financial Inclusion as a Determinant of Economic Growth in Selected Lower-Middle-Income African Countries

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Abstract

Financial inclusion indicators as determinants of economic growth in selected LMI African countries was studied using McKinnon–Shaw and financial intermediation theories. Specific objectives evaluating the effect of Commercial bank branches; and deposit accounts on rGDP. Ex-post facto research design, depended on secondary data sourced from WDI. Using descriptive statistics, correlation analysis, panel regression techniques to analyse its' data. Coefficient of commercial bank branches is -0.683 , t -statistic -2.852 and a p -value 0.005 ; and the coefficient of deposit accounts is -0.007 , t -statistic -3.368 and a p -value 0.0009 . Results showed commercial bank branches and deposit accounts had negative and statistically significant effects on economic growth proxied by rGDP growth rate in LMI African countries. Research concludes that financial inclusion contributes meaningfully to the determinants of economic growth in LMI African countries, particularly through access to credit access, savings mobilisation of savings, increased banking penetration.

Keywords: Financial inclusion, Economic Growth; Lower-Middle-Income African Countries; Commercial Banks Branches, and Deposit Accounts.

1. Introduction

Real GDP is positively correlated with banking performance indicators, such as profitability and capital adequacy. Economic expansion enables commercial bank branch expansion financially sustainable, increase in savings and mobilization by more bank branches credit allocation improvement, and reduction transaction costs (Aguirregabiria et al., 2024; Naoaj, 2023; Nguyen et al., 2021). However, the number of commercial bank branches per 100,000 adults does not always have a statistically significant effect on GDP per capita growth are not driven only by commercial banks branches unless they transform into actual financial activity, deposit accumulation, including credit provision, and account usage. The mere physical presence of commercial bank branches does not guarantee lending, account usage, financial deepening, or adoption of digital finance (Van et al., 2021; Sonkar & Sarkar, 2020). Greater savings mobilization, which permits banks to channel funds into investments and financial services access expansion as shown by a higher number of deposit accounts.

Financial inclusion make use deposit accounts per 1,000 adults as a variable in regression analyses linking inclusion and GDP. While a positive relationship is expected, not all studies find strong statistical significance (Demirgüç-Kunt & Klapper, 2013; Beck et al., 2007; IMF FAS). Nevertheless, greater deposit account penetration generally signals deeper financial inclusion, with several advantages for economic growth. Savings in formal financial institutions and credit and finance investments extended funds provided by banks as provided by deposit accounts. Accordingly, higher deposit account penetration promoted by capital formation, domestic savings, and investment in productive sectors, directly contributing to higher real GDP. The depth and financial system efficiency enhanced by a larger number of deposit accounts with

commercial bank (CBN, 2025; Kim et al., 2018). The quantity, quality, effectiveness, and efficiency of financial services, are improved financial inclusion thus improving lives, strengthening economies, and creating opportunities (Bello, 2014).

In the MENA region, access to finance is limited by underdeveloped financial markets, inadequate collateral frameworks, low liquidity, and insufficient financial deepening (Metwally et al., 2025). Banking services limited access, face challenges in commercial banks in Africa resulting in “banking deserts,” most especially in rural areas (Aguirregabiria et al., 2024). Commercial banks many branches resulted to high operational and maintenance costs. Physical branches necessity, rendering large networks inefficient are reduced by technological advancements, like fintech and digital banking (Cisternas-Vera et al., 2023). Approximately 45% of Africans stay on unbanked, highlighting constricted deposit accounts effect on economic development (Kilimvi & Ezekwesiri, 2023). Number of deposit accounts are reduced by limited digital banking access, regulatory weaknesses creating geographical inequality, and poor financial infrastructure are challenges in financial services and weakening the growth in financial sector’s contribution (Mani, Nyamute & Ondigo, 2024; Kamara & Yu, 2024).

In developing countries, Pazarbasioglu et al. (2020) revealed that 65% of adults do not have access to a transaction account, and only 20% save via formal financial institutions. Low investment, unemployment, poor infrastructure, political instability, inflation, low technological adoption, corruption, limited education and skills, over-dependence on a single sector, and rapid population growth all constrain real GDP growth in the 10 lower-middle-income (LMI) African countries under study. This study aims to investigate the effect of financial inclusion in the determinants of economic growth sampled LMI African countries from 2004 to 2023. Specifically, the objectives are: to determine the impact of the number of commercial bank branches per 100,000 adults on real GDP; and to look into the effect of the number of deposit accounts at commercial banks per 1,000 adults on real GDP. The inconclusiveness in the findings arising from the literature between financial inclusion and economic growth in LMI African countries motivate the study. It seeks clarification on the mechanisms through which financial inclusion can improve economic growth, with both theoretical and practical importance for promoting inclusive development. The following section describes the links between the various variables identified in the research questions of the study.

2. Literature review and hypothesis development

2.1 Theoretical background

2.1.1 McKinnon–Shaw Theory

Implies the relationship between the financial sector and economic growth can be traced to the works of Schumpeter (1911), Shaw (1973), and McKinnon (1973). Financial sector is a key driver of economic growth, in particular, resource-scarce economies like lower-middle income (LMI) African countries as posited by the McKinnon–Shaw framework. Financial services sector facilitates efficient resource allocation, supports productive investment, encourages savings mobilization, and stimulating economic growth (Chen et al., 2021). The theory is of the view that deposits, commercial bank branch networks, and outreach which can accelerate investment and

enhance economic growth measures financial depth. It provides a basis for understanding cross-country and time-series differences in growth, complementing exogenous and endogenous growth models. Human capital Function, innovation, and knowledge in explaining differences in economic growth across countries and over time are centered endogenous growth theory (Inoue & Hamori, 2016).

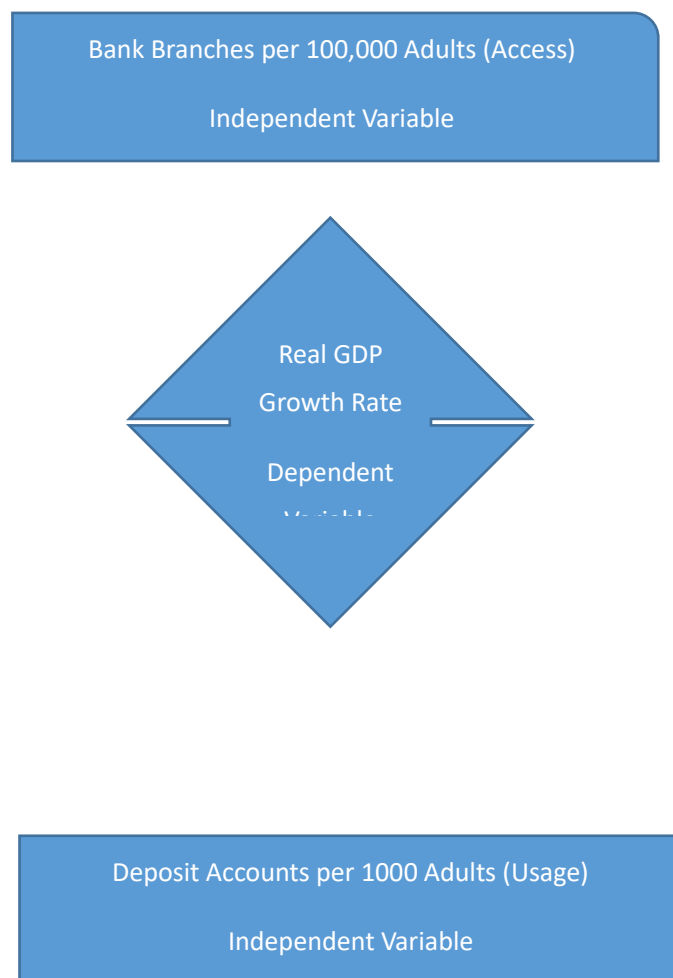
Within this framework, financial inclusion via indicators like bank branches and deposit accounts which enhances capital accumulation, productivity, and overall economic output. In endogenous growth framework, many studies highlighted financial services relevance,' Andersen & Tarp (2003), Ibrahim & Alagidede (2018), and Sharma (2019) recognize the financial services in terms of financial technology innovations, like savings, mobile money, and payments (Srouji, 2020). The theoretical relationship between financial inclusion and growth operates through two main channels (i) Access to affordable financial services which means providing low-cost financial services to underserved populations, encourages economic activity, increasing national output and improving welfare (Adedokun et.al, 2022; Nanda & Kaur, 2016; Sahay et al., 2015; Agnello et al., 2012) (ii) Savings mobilization among the unbanked means access to deposit accounts encourages vulnerable populations to save formally, increasing funds available for making fund available for productive investment, creating generation, reducing poverty, and redistributing income, in the end enhancing real GDP (Ramkumar, 2017; Yoko, 2010).

2.1.2. Financial Intermediation Theory

Wholly, financial intermediation are strengthened by both commercial bank branches (access) and deposit accounts (usage). Opportunities for peoples' involvement in the financial system created by commercial bank branches, while deposit accounts ensure get together and active mobilization of funds. Endogenous Growth Theory aligns with this process, where productivity, accumulation of capital, and economic growth are promoted via improved financial intermediation (Kim et al., 2024). In comparison, labor productivity was emphasized by the Exogenous Growth Theory (Domar, 1946) and exogenous technological progress (Solow, 1956) as primary determinants of growth differentials. Nevertheless, Chirwa & Odhiambo (2018) stated that the model widely criticized for neglecting efficiency factors, financial intermediation role, and macroeconomic conditions. The financial intermediaries between deficit units (borrowers) and surplus units (savers), information imbalance and reducing transaction costs, while putting funds to productive investment vividly in explaining financial intermediation theory and how this role is performed by financial institutions (Allen et al., 2012; Levine, 2005). Within this context, the flow of resources through physical access points is facilitated by commercial bank branches in underserved and rural areas, commercial bank branches act as infrastructure for financial intermediation, increasing outreach. The depth of financial intermediation is reflected financial usage instruments (deposit accounts). In sum, these theoretical frameworks collectively support the study's premise that financial inclusion through both access (commercial bank branches) and usage (deposit accounts) is a key driver of economic growth in LMI African countries. The following section describes the links between the different variables identified in the research questions of the study, that is, financial inclusion proxies, and rGDP growth rate.

CONCEPTUAL FRAMEWORK DIAGRAM

Fig.1



Financial Inclusion and Economic Growth Indicators Relationship

Source: Authors' Compilation

2.1.1.1 Commercial banks branches per 100,000 adults and real GDP growth rate

An essential proxy of financial inclusion and financial sector outreach is said to be the number of commercial bank branches per 100,000 adults. Existing empirical literature recommends that increased banking penetration through branch expansion improves economic activities by enhancing access to savings, credit, and other financial services. According to Ifediora et al. (2022), commercial bank branches have a positive and statistically significant effect on economic growth in Sub-Saharan African countries. The greater financial accessibility enhances financial intermediation and stimulates productive investment as shown by their results. In theory, the expansion of commercial bank branches contributes to economic growth by reducing transaction costs, increasing access to credit facilities for households and businesses, and mobilizing rural savings. Banking outreach also promotes investment and entrepreneurship was also promoted by banking outreach, in particular, in underserved rural communities where financial exclusion is prevalent.

Improved financial outreach strengthens capital accumulation and economic productivity via improved allocation of financial resources as argued by recent studies. Moreover, branches availability in both semi-urban and rural areas facilitates comprehensive economic participation by integrating previously unbanked populations into the formal financial system. This supports employment creation, investment, and higher levels of consumption, which ultimately contribute to real GDP growth. Additionally, investment activities and financial accessibility via banking infrastructure stimulates mobilization of savings, hence promoting sustainable economic growth (Zhang et al., 2025). However, in spite of these benefits, significant constraints were confronted

by branch expansion in several developing economies. Physical bank branches sustainability as well as profitability regularly limited by weak institutional frameworks, inadequate infrastructure, high operational and maintenance costs, and low population density in rural areas. In recent years, digital financial services like fintech platforms, and mobile banking have more and more complemented traditional branch networks, assisting in overcoming infrastructural barriers and geographical to financial inclusion.

H₁: The number of Commercial banks branches per 100,000 adults have no significant consequence on the real GDP growth rate of Lower-Middle Income African countries

2.1.1.2 An essential financial usage indicator and participation within the broader financial inclusion framework as represented by deposit accounts with commercial banks per 1,000 adults. In theory, economic growth improved by financial inclusion via mobilization of savings improvement, strengthening credit creation mechanisms, facilitating efficient resource allocation, and promoting investment, financial inclusion improves economic growth by improving savings mobilization, facilitating efficient allocation of resources, promoting investment, and strengthening credit creation mechanisms. Households and firms with access to formal financial systems, and provided by deposit account, thus improving the intermediation function of financial institutions, and safer savings accumulation. Mixed evidence regarding the relationship between economic growth and deposit accounts, in particular, low- and middle-income (LMI) African countries. Studies like Ifediora et al. (2022) found that was positively affected by deposit accounts, even though the relationship is weak and statistically insignificant in certain cases. Structural challenges prevalent in sub-Saharan Africa, including low-income levels that limit the

persons tendency to maintain multiple accounts without corresponding productive financial activity, limited trust in formal banking institutions, dormant or inactive accounts, and savings capacity was attributed to this study's outcome.

In spite of these limitations, deposit accounts remain vital instruments for financial deepening and mobilization of savings, which collectively provide the foundation for credit expansion and productive investment. Deposits constitute a major transmission mechanism through which financial inclusion influences economic growth as emphasised by the recent literature. The banking sector's capacity to provide loans to households and businesses, thus aggregate output, productivity, stimulating investment strengthened by mobilization of deposit. Financial inclusion proxies connected to usage of financial services, including deposit ownership, hence contribute indirectly to sustainable economic development by integrating more persons into the formal financial system. The nexus between economic growth and financial inclusion was strongly supported by the broader empirical literature. A significant positive relationship between financial inclusion and economic performance across developing economies was reported by several studies (Van & Linh, 2019; Chatterjee, 2020; Nizam et al., 2020; Yakubu et al., 2023; Maruta et al., 2023; Mostafa et al., 2023; Hassouba, 2023).

For instance, financial inclusion dimensions (quality, access, and usage) concluded that access to financial services exerts the strongest effect on inclusive development, and women's empowerment in particular in low- and lower-middle income economies (Maruta et al., 2023). Likewise, Hassouba (2023), argued that financial inclusion enhances economic growth via channels like ATM penetration, debit and credit card ownership, loans, and increased deposits, using Egyptian evidence. The importance of understanding the financial behavior of low-income populations to improve financial inclusion results as further emphasized by the study. Moreover, financial inclusion and economic growth was investigated in 22 sub-Saharan African countries between 2012 and 2018 making use of system Generalized Method of Moments. Financial access proxies, like ATMs and bank branches, exerted significant positive effects on economic growth, while usage proxies like outstanding loans and deposit accounts contributed positively but insignificantly to growth. Growth was negatively influenced by Outstanding deposits. To conclude, access dimensions of financial inclusion produce more immediate economic effects than usage dimensions, thereby supporting the supply-leading hypothesis of financial development (Ifediora et al., 2022)

In another related study, moderating role of financial access on the relationship between income inequality and economic growth in 48 Sub-Saharan African countries utilizing sys-GMM approach as examined. Inclusive financial access reduces inequality and positively moderates the impact of income inequality on economic growth as demonstrated by the results. Broadening formal financial services access contributes to inclusive and sustainable economic development as reinforced by these findings (Menyelim et al., 2021). In spite of financial inclusion positive role, many structural barriers continue to impede the deposit accounts effectiveness in many African economies. The problems are limited accessibility to digital banking platforms, inadequate internet penetration, low financial literacy, geographical inequalities in banking services, and poor digital financial infrastructure.

Accordingly, although many LMI African countries have relatively considerable the number of active deposit accounts per 1,000 adults, numbers of commercial bank branches per 100,000 adults remains comparatively low, thereby lowering the overall contribution of the financial

sector to economic growth. In addition, the combined effects of physical financial access (commercial bank branches) and financial usage indicators (deposit accounts) on economic growth, especially within the context of expanding digital financial infrastructure in Africa was simultaneously examined by the limited empirical studies. Further investigation into how both physical and digital dimensions of financial inclusion jointly influence economic growth outcomes in LMI African countries was necessitated by this gap. Based on the foregoing theoretical and empirical arguments, the study hypothesizes that:

H₂: The number of deposit accounts at Commercial banks per 1,000 adults have no significant effect on the real GDP growth rate of Lower-Middle Income African countries.

2.2 Literature Review

Empirically, rich literature provide explanation nexus between economic growth and financial inclusion. Several studies have reported a positive relationship (Yakubi et al., 2023; Maruta et al., 2023; Mostafa et. al., 2023; Hassouba, 2023; Van and Lihn, 2019). Generally, Maruta et al. (2023) examines and compare the effectiveness of the three dimensions of financial inclusion like usage, access, and quality, and the first most influential indicators, based on their PCA score, of these dimensions. In examining the relative importance to financial inclusion dimensions, it was found that financial services access has a higher impact on women's empowerment. Additionally, the study found that financial inclusion effect on women's empowerment is higher in low and LMI countries compared with UMI countries in the region. Finding underscores the importance of financial access in promoting inclusive economic development.

Similarly, Hassouba (2023) states that financial inclusion (FI) influences economic growth vast various channels. The study investigates the underlying process of financial inclusion in Egypt theoretically. Employing secondary data from the Global Findex and FAS Databases for the analysis, that is to say, credit and debit cards ownership, outstanding deposits and loans with commercial banks, ATMs. The study based on the an in-depth interviews with the main stakeholders of the financial inclusion process in Egypt as well as using descriptive approach. Interviews results revealed that new FI vision should possess a deep knowledge understanding of the financial lives low-income groups and the poor and, including how they were acquired, use, and manage their money. Ifediora et al. (2022) examine the impact of financial inclusion on economic growth in 22 Sub-Saharan African countries from 2012 to 2018 using the system Generalized Method of Moments (sys-GMM). The study employs a composite financial inclusion index and finds that: Availability (e.g., bank branches, ATMs) and the penetration dimension significantly and positively impact economic growth.

Outstanding loans and deposit accounts promote growth but not significantly, whereas outstanding deposits negatively affect growth. The results suggest that access (bank branches, ATMs) has a more immediate effect on economic growth than usage indicators (deposit accounts), consistent with the supply-leading hypothesis in financial development. Menyelim et al. (2021), evaluates the relevance of inclusive financial access in moderating the effect of income inequality on economic growth in 48 countries in Sub-Saharan Africa (SSA) for the period 1995 to 2017. Using the Generalised Method of Moments technique. In reducing inequality in the short run, contrary to the Kuznets curve, contributions made by financial access.

A negative impact of financial access on the relationship between economic growth and income inequality. There is a positive influence of financial access inclusivity in moderating income inequality impact on economic growth as revealed by the result.

Other studies confirm that financial inclusion promotes economic prosperity across countries and regions (Chatterjee, 2020; Nizam et al., 2020; Inoue & Hamori, 2016). However, challenges such as banking accessibility are reduced by limited digital banking access, and poor financial infrastructure: Geographical inequality in financial services, Lower number of deposit accounts per 1,000 adults, Decrease in contribution of the financial sector to economic growth. In spite of the presence of a significant number of commercial bank branches per 100,000 adults in LMI African countries, limited studies have explicitly examined the combined impact of branch availability and deposit account usage on economic growth, particularly in the context of digital financial infrastructure. This gap underscores the research need that integrates both physical and digital dimensions of financial inclusion to assess their combined effect on economic growth.

Overall, this study makes immense theoretical and methodological contributions to the financial inclusion study area. Using two proxies of financial inclusion deposit accounts and commercial bank branches, and investigate how they impact the real GDP growth rate. Therefore, this study closes the knowledge gap and contributes significantly to the financial inclusion study literature. In addition, this study employs both McKinnon–Shaw theory, and Financial intermediation theory thereby extending the applicability of the theory.

3. Research Methodology

3.1 Model Specification

The correlation analysis as well as descriptive statistics were used, hypotheses were tested using fixed effect regression result, using E-VIEW Software. The model for the study was adopted from the study of Nwafor and Aremu (2018). The author's model was specified as:

$$\text{GDP} = b_0 + b_1\text{FDI} + b_2\text{ATMTs} + b_3\text{BBS} + b_4\text{LRBs} + \mu \dots \text{i}$$

$$\text{BBS} = b_0 + b_1\text{LDR} + b_2\text{LSSE} + b_3\text{BLR} + \mu \dots \text{ii}$$

This model was modified to suit the variables of this study. The inclusive growth as the dependent variable proxy with rGDPGR and financial inclusion was proxy with {Financial Deepening Indicator (FDI), ATM Transactions (ATMTs), Bank Branches Spread (BBS), Loans of Rural Branches (LRBs), and Rural Bank Deposits (RBDs)} are the independent variables. However, for this study the above model is restated as follows:

$$\text{RGDPGR} = f(\text{COMBB}, \text{DEPACCT}) \dots \text{i}$$

$$\text{The functional relationship is expressed as: } \text{RGDP} = f(\text{COMBB}, \text{DEPACCT}) \dots \text{ii}$$

$$\text{The econometric model is specified as: } \text{RGDP}_{it} = \beta_0 + \beta_1\text{COMBB}_{it} + \beta_2\text{DEPACCT}_{it} + \mu_{it} \dots \text{iii}$$

This specification follows standard panel data models used in financial inclusion and growth studies (Baltagi, 2021).

The above equation is decomposed below:

$$RGDPGR = \beta_0 + \beta_1 COMBB + \beta_2 DEPACCT + \mu_{it} \dots \dots \dots iv$$

Where;

RGDPGR = Real Gross Domestic Product Growth Rate

COMBB = Number of Commercial Bank Branch Per 100,000 Adults

DEPACCT = Number of Deposit Account at Commercial Bank

μ_{it} = Error Term

$\beta_0 + \beta_2$ = the Parameters

A prior Expectation = $\beta_1, \beta_2 > 0$ This model used in this study is differentiated from that of Nwafor and Aremu (2018) because made use of four independent variables while this study made use of two independent variables. Secondly, this study use same modified model used by the author in his study, that is, real gross domestic product, and finally, this study will conduct various diagnostics tests because of the annual time series of the data while the study Nwafor and Aremu (2018) did not conduct any diagnostics tests.

3.2 Definition of Variables and Data Sources

While commercial bank branches (per 100,000 adults) indicate financial access by showing the number of retail bank branches available for every 100,000 adults, usually aged 15 and above, in a country. They are separate from the main office but are not legally independent subsidiaries (World Bank, 2024; International Monetary Fund, 2024); Number of deposit accounts at Commercial banks per 1,000 adults measures how financial inclusion widely provide banking services among adults, reflecting total deposit accounts per 1,000 people held by households and non-financial corporations (International Monetary Fund, 2024; World Bank, 2024). Using annual time series data from 2004 to 2023 are adopted in this study. The choice of the study period is guided by data availability and consistency across variables. Countries like Algeria, the Republic of the Congo, Côte d'Ivoire, Djibouti, Ghana, Kenya, Mauritania, Morocco, Sao Tomé and Príncipe, Senegal, and Zimbabwe were excluded due to unavailability of complete data in the said LMI African countries. The following ten countries were selected due to complete datasets which include: Northern Africa (Tunisia and Egypt); East Africa (Comoros and Tanzania); Central Africa (Cameroon and Angola); South Africa (Lesotho and Eswatini) and West Africa (Nigeria and Guinea). The data used in this study were obtained mainly from the World Development Indicator of World Bank, Federal Reserve Economic Data, and Central Bank of Nigeria statistics databases. These databases are widely recognized for providing reliable and internationally comparable macroeconomic data (Demirgüç-Kunt et al., 2018). See table 1 and 2 below.

Table 1 Variables, Measures, and Data Sources

S	Variables	Notation	Role	Source	Unit of Measure
1	Real Gross Domestic Product growth rate	RGDPGR	Dependent	World Development	A nations real gross domestic product from

			Variable	Indicator	year to year
2	Commercial Bank Branches	COMBB	Independent Variable	WDI, IMF, & CBN	(number of branches)* 100,000/adult population
3	Deposit Account with commercial Bank	DEPACCT	Independent Variable	WDI, IMF, & CBN	(number of depositors) * 1,000/ adult population

Source: Author's Compilation, 2026 extracted from WDI of World Bank

A general formula for calculating the population growth rate is $Gr = N / t$.

Gr is the growth rate measured in individuals, N is the change in population, and t ...

Table 2 Classification of Ten selected Lower-Middle Income Africa Countries

S/N	Northern Africa	West Africa	Central Africa	East Africa	South Africa
1.	Tunisia	Guinea	Cameroon	Comoros	Lesotho
2.	Egypt	Nigeria	Angola	Tanzania	Eswatini

Source: Author's Compilation from World Bank (2026)

3.3 Design and Sample

The study adopts an ex-post facto research design, this is because the data for the study has to do with events that have already taken place which cannot be manipulated by the researcher, and is suitable for analyzing historical data without manipulation of variables (Gujarati & Porter, 2009). Using the instrument of Panel Least Square regression with the aid of statistical package E-View version 13.0. This design allows for the investigation of causal relationships between financial inclusion indicators and economic growth. Number of commercial banks branches per 100,000 adults, and number of deposit accounts with commercial banks per 1,000 adults, and economic growth in the ten LMI African countries which are the main explanatory variables used in this study while the dependent variable for economic growth is the rGDP. PLS is acknowledged to be the best linear unbiased estimator as revealed by the technique choice. Panel data estimation is advantageous because it controls for unobserved heterogeneity, improves efficiency of estimates, and combines cross-sectional and time-series data (Baltagi, 2021).

4. Results

4.1. Descriptive Statistics

Descriptive statistics of the study variables was presented in Table 3., the dependent variable (real GDP) had a mean value of 3.256, indicating that the average level of economic growth across the ten selected LMI African countries in the period under review is 3.256. The maximum and minimum values of rGDP are 20.965 and -9.764 respectively. The descriptive statistics show that the average economic growth rate across the ten selected LMI African countries from 2004-2023 was 3.256%. This means, on average, the economies experienced moderate positive growth over the study period. 20.965% shows the maximum value of that at least one country recorded a very high level of economic growth during a specific year, reflecting a period of strong economic expansion. On the other hand, -9.764% shows the minimum value meaning that one or more countries experienced severe economic contraction during the study period, which means instability periods.

The wide gap between the maximum and minimum values means substantial variation in economic growth performance among the ten selected countries and across various years. While limited countries achieved significant economic progress, others were confronted economic downturns in the period under review as shown by the study. 5.266 which is the standard deviation, is higher than the mean value 3.256. Number of commercial bank branches with a mean value of 5.277, meaning that physical banking infrastructure accessibility and availability was also relatively limited in all the ten selected LMI African countries. Reflecting problems in financial service penetration and accessibility within the banking sector. The number of deposit accounts with a mean value of 295.885, indicating a relatively higher participation level in the formal banking system as compared to other financial inclusion indicators. This mean a significant proportion of the population maintained bank accounts, may improve mobilization of savings and financial transactions.

The standard deviation of rGDP (5.266) is higher than its mean value of 3.256, showing a high level of dispersion in economic growth among in the ten selected LMI African countries during the period under consideration. Meaning that the growth rates varied considerably in all countries and years, reflecting differences in macroeconomic stability, economic performance, and exposure to economic shocks. A standard deviation of 4.849, for commercial bank branches as shown by the descriptive statistics which is relatively low as compared to the other variables. Commercial bank branches distribution in all the ten selected LMI African countries was fairly stable and less dispersed around the mean as shown. In other words, the countries showed relatively similar commercial banks branch levels availability. Deposit accounts recorded a high standard deviation of 340.122, showing substantial variation in the number of deposit accounts in all the ten countries and over time. Meaning that while some countries had a high level of banking participation, others experienced much lower levels of account ownership. The results show that commercial bank branches exhibited the least variability among the financial inclusion indicators, implying relative uniformity across the countries, whereas deposit accounts and outstanding loans showed high variability, reflecting uneven levels of financial inclusion and credit accessibility within the sampled economies.

The maximum values of commercial bank branches, and deposit accounts, are 22.107, and 1797.086 respectively, while both commercial bank branches, and deposit accounts has corresponding minimum values of 0.000. The maximum and minimum values of the financial inclusion proxies give insight into the extent of financial service accessibility and usage in all ten selected LMI African countries during the period under consideration. Maximum value for

Commercial bank branches is 22.107, implying that certain countries possessed a relatively well-developed network of banking with greater physical access to financial institutions. Conversely, the minimum value of 0.000 indicates near absence of commercial bank branches in certain observations, highlighting intense limitations in banking availability within certain economies. 1797.086 means a maximum value for deposit accounts, meaning a very high level of banking participation and account ownership in certain countries. This reflects stronger integration of persons and businesses into the formal financial system. However, certain countries experienced exceedingly low or no recorded deposit account ownership during particular periods as indicated by the minimum value of 0.000, pointing to financial exclusion and limited use of banking services (Wooldridge, 2016).

Table 3 Descriptive Statistics Summary

Description	RGDPGR	COMBB	DEPACCT
Mean	3.256	5.277	295.885
Median	2.085	3.761	164.369
Maximum	20.965	22.107	1797.086
Minimum	-9.764	0.000	0.000
Std. Dev.	5.266	4.849	340.122
Skewness	1.159	2.046	1.555
Kurtosis	5.000	6.876	5.553
Jarque-Bera	78.085	264.704	134.915
Probability	0.000	0.000	0.000
Sum	651.153	1055.437	59176.91
Sum Sq. Dev.	5517.900	4678.963	23020965
Observations	200	200	200

Source: Author's Computation Using E-Views 13.0 (2025)

4.2. Correlation Analysis

Using the Pearson correlation technique to evaluate the strength and direction of the relationship among the variables, as well as the linear relationship extent between them. The degree to which two variables move together was measured by the Pearson correlation Coefficient, with values ranging from -1 to +1, showing perfect negative and positive linear relationships respectively, while a value of zero suggests no linear relationship. Analysis outcomes are presented in the

correlation matrix, which provides a broad pairwise relationships summary among the independent, and the dependent. This analysis also assists in identifying potential multi-collinearity issues among the explanatory variables, which may affect regression estimates reliability (Gujarati & Porter, 2009; Wooldridge, 2016). See table 4 below.

Table 4 Correlation Matrix Table

	RGDPGR	COMBB	DEPACCT
RGDPGR	1		
COMBB	-0.172	1	
DEPACCT	-0.129	0.571	1

Source: Author's Computation Using E-Views 13.0 (2026)

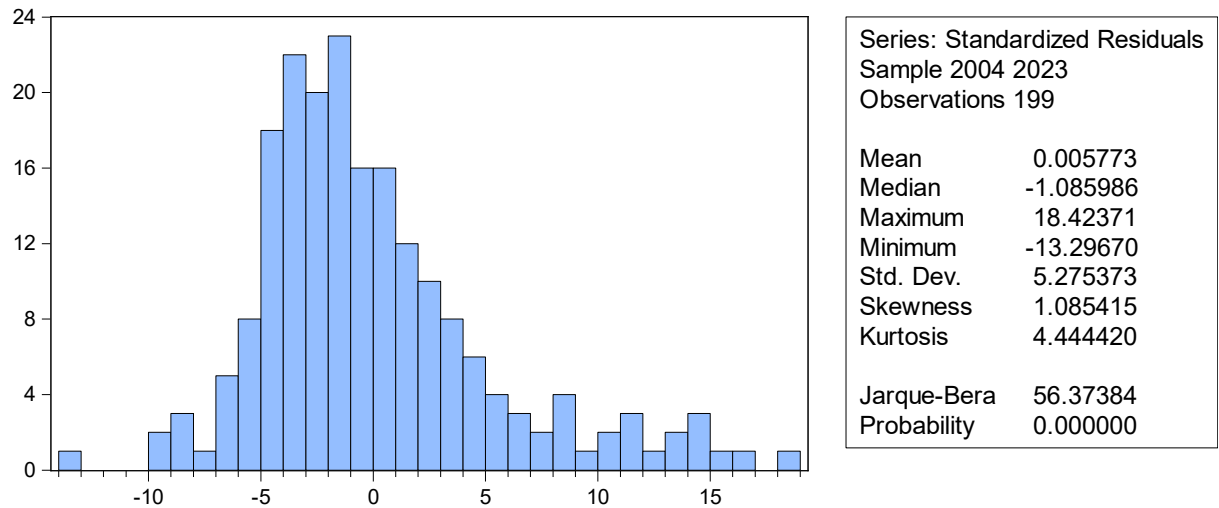
4.3. Histogram-Normality Test

To assess whether the estimated model residuals fulfill the assumption of normality, conducting a normality test. Presenting the outcomes in the Fig.2. The histogram of the standardized residuals appears not to follow a perfectly symmetric bell-shaped distribution, suggesting some degree of deviation from normality. The skewness value of 1.085 shows that residuals are positively skewed, meaning that the distribution is skewed, meaning that the distribution has a longer right tail. In addition, 4.444 is the kurtosis value which is greater than 3, indicating a leptokurtic distribution characterized by a sharp peak and heavy tails. Residuals are more peaked and have heavier tails than a normal distribution as suggested. Moreover, 56.373 is the Jarque-Bera statistic with a corresponding probability value of 0.000. Since the probability value is less than the 5% level of significance (<0.05), the null hypothesis of normal distribution is rejected. This implies that residuals are not normally distributed. The hypotheses for the test are stated as follows:

H_0 : The residuals are normally distributed.

H_1 : The residuals are not normally distributed.

Fig. 2



Residual Diagnostics Test Result-Histogram-Normality Test

The implication of this result is that the model violates the normality assumption of the classical linear regression model. The non-normality of the residuals likely to arise from the presence of outliers, omitted variables, model misspecification, structural breaks, or non-linear relationships among the variables. Nevertheless, in large samples, the violation of normality may not seriously affect the consistency of the estimators due to the Central Limit Theorem. Overall, although the residuals are not normally distributed, the estimated model may still be reliable for inference if other diagnostic tests such as heteroskedasticity, serial correlation, and stability tests are satisfactory.

4.4. Multicollinearity Test

Table 5 Testing of Multicollinearity Using Variance Inflation Factor

Variable	Uncentered VIF	Centered VIF
COMBB	3.080	2.065
DEPACCT	1.696	1.403
C	4.761	NA

Source: Researcher's computation, E-View 13.0

From the text of multi-collinearity is presented in Table 5. The results show that all the variable have a Variance Inflation Factor value that does not exceed the requirement of (<10) for no collinearity stated by the VIF. In interpreting multi-collinearity, the centered VIF values are commonly used. A centered VIF value below 10 indicates the absence of serious multi-collinearity, while values above 10 suggest high multi-collinearity problems. The Variance carried out Inflation Factor test to examining the presence of multi-collinearity among the explanatory variables in the regression model. Multicollinearity happens when two or more independent variables are highly correlated, which likely to lower the regression reliability outcomes, and expand the estimated coefficients the standard errors. The outcomes indicates that all the explanatory variables have centered VIF values less than 10. Particularity, 2.065 is the centered VIF for COMBB, and 1.403 for DEPACCT. These values are substantially lower than

the threshold value of 10. This shows that there is no serious multi-collinearity among the independent variables enclosed in the model. Thus, the explanatory variables are not highly linearly correlated with one another, and the estimated regression coefficients are reliable and stable for statistical inference. Moreover, low VIF values means that each explanatory variable contributes unique information to the model without causing significant distortion in the estimation results. Accordingly, the regression estimates can be interpreted with confidence, as multi-collinearity is not a problem in the model. Overall, the VIF diagnostic test confirms that the model satisfies the assumption of no perfect multi-collinearity under the classical linear regression model.

4.5. Unit Root Test/Stationarity Test

A unit root test is conducted on time-series data to determine whether the variables are stationary. Stationarity means statistical properties of a series like the mean, variance, and covariance remain constant over time. Ensuring stationarity is essential to avoid spurious regression results and to enhance the reliability of parameter estimates, in econometric analysis. In this study, using both the Augmented Dickey-Fuller and Phillips-Perron tests to examine stationarity. To test for the presence of a unit root, where the rejection of the null hypothesis shows that the series is stationary, the study applies Augmented Dickey-Fuller Test. Similarly, the Phillips-Perron Test provides a robustness check by correcting for serial correlation and heteroskedasticity in the error terms. When ADF or PP test statistic is more negative than the corresponding critical value, leading to null hypothesis rejection of a unit root, a variable is seen to be stationary. Conversely, failure to reject the null hypothesis indicates non-stationarity.

The variables of the study are integrated of order zero, $I(0)$, and order one, $I(1)$. A variable is said to be integrated of order zero, $I(0)$, when it is stationary at level, meaning its mean, variance, and auto-covariance are constant over a period of time. Contrary, a variable is integrated of order one, $I(1)$, when it's non-stationary at level but becomes stationary after first differencing. Differencing refers to the transformation of a series by subtracting the previous observation from the current observation; thus, first differencing an $I(1)$ series yields a stationary $I(0)$ series. Based on the Augmented Dickey-Fuller and Phillips-Perron unit root test statistics, the stationarity properties of the variables were examined. The null hypothesis for both tests states that a variable contains a unit root, meaning non-stationarity. The findings show that certain variables are stationary at level, while others become stationary after first differencing. Specifically, RGDP, and Commercial Bank Branches, are stationary at level, indicating that they are integrated of order zero, $I(0)$. In contrary, Deposit Accounts with Commercial Banks (DEPACCT) is non-stationary at level but become stationary after first differencing, implying that they are integrated of order one, $I(1)$. The detailed results of the unit root tests are presented in Table: 6.

Table 6 Augmented Dickey Fuller Unit Root Test

VARIABLES	LEVEL	FIRST DIFFERENCE	ORDER OF INTEGRATION
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	Levin, Lin & Chu t*	PP-Fisher Chi-square tests	Levin, Lin & Chu t*	PP-Fisher Chi-square tests	
RGDP	-3.198**	54.759**	-7.812**	794.260**	I (0)
COMBB	-3.772**	43.018	-3.436**	127.199**	I (0)
DEPACCT	0.166**	31.375**	-3.510**	368.701**	I (1)

*The levin, Lin and Chu test; Null hypothesis: Unit root (assumes common/group unit root process).

Sources: Author's Computation Using E-Views 13.0, 2026

The table presents the panel unit root tests results using the Levin, Lin and Chu test and the PP-Fisher Chi-square test to determine the stationarity properties of the variables. The null hypothesis for both tests is that the series contains a unit root, implying non-stationarity. At the 5% level of significance, the results indicate that Real Gross Domestic Product, and Commercial Bank Branches, are stationary at level, indicating that they are integrated of order zero, I(0). This means that these variables do not require differencing before estimation. Only Deposit Accounts with Commercial Banks (DEPACCT) is found to be non-stationary at level but becomes stationary after first differencing, meaning it's integrated of order one, I(1). Overall, the variables exhibit a mixture of I(0) and I(1) integration orders.

4.6. Data Analysis

Using Microsoft Excel to organise and clean the research data, an acceptable tool for managing large datasets, performing data cleaning, and carrying out preliminary accuracy checks and completeness. The dataset was imported into E-Views 13.0 for further econometric and statistical analysis having prepared the data. As a result of its strong capabilities in handling advanced econometric procedures, including diagnostic testing, regression analysis, and panel data estimation, E-views was employed by the study. The combined use of Excel and E-views gives distinct advantages in data management and empirical analysis, efficiency, ensuring accuracy, and robustness in the results of the study. The suitability of handling the specific analytical requirements of the study responsible for these software packages selection.

4.7. Regression Analysis for RGDPGR

Table 7 presents the regression analysis result based on pooled, fixed effects, and random effects techniques. An agreement was demonstrated in the results of the three approaches.

Table 7 Result of Static Panel Regression Analysis for RGDPGR model

Variables	Pooled OLS	Fixed Effects Model	Random Effects Model
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	Coef	Std Error	P-Value	Coef	Std Error	P-Value	Coef	Std Error	P-Value
C	4.390	1.325	0.000	14.372	3.106	0.000	7.042	2.113	0.001
COMBB	-0.335	0.118	0.005	-0.681	0.239	0.005	-0.381	0.185	0.040
DEPACCT	-0.002	0.001	0.279	-0.007	0.002	0.001	-0.003	0.002	0.083
R-squared	0.146			0.612			0.053		
Adjusted R-squared	0.119			0.531			0.023		
Prob (F-statistic)	0.000			0.000			0.102		
Durbin-Watson stat	0.424			0.521822			0.298		

Source: Author's Computation Using E-Views 13.0 (2026)

Judging from the panel regression analysis results, it's evident that the results sourced from the Pooled Ordinary Least Squares, Fixed Effects, and Random Effects models differ across specifications. The variations suggest the presence of heterogeneity across the ten selected countries, thereby justifying the need for model selection procedures like the Hausman test. Broadly, the number of Commercial banks branches, and Depositors Account both indicating a negative and statistically significant relationship with economic growth, proxied by Real Gross Domestic Product Growth Rate (RGDPGR), in the ten LMI African countries as result indicated. Meaning that increases in these variables were associated with reductions in economic growth during the study period.

4.8. Hausman's Test Specification

In determining the appropriate model that best suit the discussion of the analysis and the purpose of valid reference, Conducting Hausman's specification test between fixed effects model and random effects model is compulsory (Hausman's, 1978). Hence, Table 8 below presents Hausman's specification test. Hausman's specification test was conducted to determine the appropriate panel estimation technique between the fixed-effects and random-effects models. The test examines whether the unobserved cross-sectional and period-specific effects are correlated with the explanatory variables. A statistically significant Hausman test result ($p\text{-value} < 0.05$) leads to the rejection of the null hypothesis and supports the use of the fixed-effects model, whereas an insignificant result ($p\text{-value} > 0.05$) supports the random-effects model. Therefore, the model selection was based on the probability value of the Hausman test.

Table 8 Hausman's Specification Tests on Panel Model Result

Test Summary	Chi-Sq. Statistics	Chi-Sq. d.f.	Probability
Cross-section random	14.427	6	0.0252

* **WARNING: Period test variance is invalid. Hausman statistic

Source: Author's Computation Using E-Views 13.0 (2026)

*, **, ***, indicate significant at 10%, 5%, 1% levels, respectively.

4.8.1. Model Estimation and Hausman Test

Using Panel Least Squares regression (PLS), the study started with the estimation of the baseline model. However, given the panel structure of the data, it was necessary to determine the most suitable estimation technique between the Random Effects Model (REM) and Fixed Effects Model (FEM). To achieve this, the Hausman specification test was applied. The Hausman test is used to assess whether there is a systematic difference between the FEM and REM estimators and to determine whether the unique errors are correlated with the regressors. In doing so, it helps to identify the most consistent and efficient estimator for the model and detect potential model mis-specification (Hausman Test) by doing this. The hypotheses for the Hausman test are stated as follows:

-Null hypothesis (H_0): The Random Effects Model is appropriate (i.e., no correlation between the error term and the explanatory variables).

-Alternative hypothesis (H_1): The Fixed Effects Model is appropriate (i.e., correlation exists between the error term and the explanatory variables).

The decision rule is based on the probability value (p-value):

-If $p\text{-value} > 0.05$, fail to reject $H_0 \rightarrow$ Random Effects Model is preferred.

-If $p\text{-value} < 0.05$, reject $H_0 \rightarrow$ Fixed Effects Model is preferred.

According to Gujarati and Porter (2009), when the p-value is statistically significant at the 5% level, the Fixed Effects Model is preferred for valid inference. Conversely, when the p-value is not statistically significant, the Random Effects Model is considered more appropriate. In this study, the Hausman test result produced a Chi-square statistic of 14.427 with a probability value of 0.0252. Since the p-value is lesser than 0.05, the null hypothesis is rejected. In comparing the appropriateness for analysis of either the Random Effects Model or the Fixed Effects Model.

Fixed Effects Model is said to be more suitable for the analysis. Meaning its' adoption based on empirical analysis. In confirming this decision, the Hausman test was re-estimated, yielding a Chi-square statistic of 0.000 with a probability value also greater than 0.05. There is no systematic difference between the Fixed Effects and Random Effects estimators as reinforced by the conclusion.

4.9. Test of Hypotheses

Research Hypothesis One

H₁: Number of commercial bank branches per 100,000 adults has no significant effect on the real GDP of Lower-Middle Income Africa countries.

The fixed effect regression results reveal that the coefficient of commercial bank branches per 100,000 adults is -0.683 with a t-statistic of -2.852 and a p-value of 0.005 . The negative coefficient indicates that an increase in commercial bank branch penetration is associated with a decrease in real GDP among LMI African countries. Since the p-value is less than the 5% level of significance, the effect is statistically significant. Consequently, the null hypothesis that commercial bank branches have no significant effect on real GDP is rejected. The findings therefore suggest that commercial bank branch penetration exerts a negative and significant effect on economic growth in lower-middle-income African countries during the study period.

Research Hypothesis Two

H₂: Number of deposit account with Commercial banks per 1,000 adults has no significant effect on the real GDP of lower-middle income Africa countries.

The fixed effects regression results reveal that the coefficient of the number of deposit accounts with commercial banks per 1,000 adults is -0.007 with a t-statistic of -3.368 and a p-value of 0.001 . The negative coefficient indicates an inverse relationship between deposit accounts and real GDP in LMI African countries. Since the p-value is less than the 5% significance level, the effect is statistically significant. Consequently, the null hypothesis that deposit accounts have no significant effect on rGDP is rejected. The findings therefore suggest that deposit accounts with commercial banks exert a negative and significant effect on economic growth in the ten sampled lower-middle-income African countries during the study period.

5. Discussions

The Global Financial Inclusion (Global Findex) Database (2017), as well as the study by Klapper and Singer (2015), indicate that lower-income populations are disproportionately financially excluded. The main objective of this study was to examine the effect of financial inclusion on economic growth in lower-middle income (LMI) African countries. Generally, the impact of commercial bank branches (COMBB), and deposit accounts with commercial banks (DEPACCT) on real Gross Domestic Product growth were analysed by the study. Based on the panel least squares regression results, financial inclusion proxies collectively play a significant role in

explaining variations in economic growth. Past empirical findings, financial inclusion emerged as an important determinant of economic development. Studies by Lai (2023), Nizam et al. (2020), Erlando et al.(2020), and Kim et al.(2018) emphasize that economic growth is supported by financial inclusion, poverty reduction, and improved welfare outcomes through broader access to financial services.

5.1. Effect of number of Commercial bank branches per 100,000 adults and real GDP

The empirical findings of this study reveal that the number of commercial bank branches per 100,000 adults has a negative and statistically significant effect on real GDP in lower-middle income (LMI) African countries. This outcome suggests that expansion in commercial bank branch networks does not necessarily translate into improved economic growth within the ten LMI African countries. Existing literature provides support for this negative relationship. Ross Levine (1997) argued that although financial institutions are expected to promote economic growth through efficient mobilization of savings and allocation of credit, weak institutional structures and inefficiencies within the financial system may prevent banking expansion from contributing positively to economic growth. Characteristics like weak regulatory frameworks, high transaction costs, poor credit allocation mechanisms, and inefficient financial intermediation may reduce the productive impact of commercial bank branches, particularly in developing economies.

Similarly, Demirgüç-Kunt and Levine (2008) observed that the mere expansion of banking infrastructure is insufficient to stimulate economic growth if financial services are not effectively directed toward productive sectors of the economy. In many African countries, commercial bank branches are disproportionately concentrated in urban areas, while rural populations remain financially excluded. Commercial banks in many African countries tend to prioritize profit-oriented urban markets rather than rural communities, thereby limiting the developmental impact of branch expansion (Beck, Demirgüç-Kunt, and Martinez Peria, 2007). Branch expansion may increase banking activities without generating corresponding improvements in economic productivity due to mobilization of deposits(Adusei, 2013). Likewise, Naceur and Ghazouani (2007) argued that inefficient banking systems can result in resource misallocation, poor investment decisions, and financial instability, thereby weakening the contribution of commercial bank branches to economic development.

Ezewulu and Ezeanyejí (2024) also noted that weak financial inclusion, inadequate rural penetration, and the inability of commercial banks to effectively support productive economic activities contribute to the negative impact of bank branch expansion on economic growth. Ozili (2022) argued that the rise of mobile banking, internet banking, fintech services, and agency banking has reduced the relative importance of physical bank branches in promoting financial inclusion and economic growth. Consequently, investments in physical banking infrastructure may yield lower economic returns relative to investments in digital financial technology infrastructure. The result of this study aligns with the findings of Van and Linh (2019) and Inoue and Hamori (2016), who also reported a negative and significant relationship between bank branch expansion and economic growth. However, the present findings contrast with studies such as Jima and Makoni (2023), Onaolapo and Ajose (2019), and Saha et al. (2018),

which reported that financial inclusion indicators, including bank branch penetration, positively influence economic growth by improving financial accessibility, reducing transaction costs, and enhancing credit access. Differences in findings across studies may be attributed to variations in institutional quality, financial sector efficiency, country-specific conditions, levels of digital financial adoption, and methodological differences.

5.2. Effect of number of deposit accounts at Commercial bank per 1,000 adults and real GDP

The empirical results reveal that the number of deposit accounts with commercial banks per 1,000 adults has a negative and statistically significant effect on real GDP in LMI African countries. This finding suggests that an increase in deposit account ownership is associated with a reduction in economic growth within the sampled countries. This outcome contradicts conventional financial deepening theories such as those of Ronald McKinnon and Edward Shaw (1960), which posit that increased financial savings and deposit mobilization enhance economic growth by expanding the pool of loanable funds for productive investment. In theory, greater deposit accumulation should improve capital formation and stimulate economic activity. However, this effect depends critically on the efficiency of financial intermediation.

Consistent with the arguments of Levine (1997), the impact of financial development on growth depends not merely on the volume of deposits but on how effectively financial institutions allocate these resources. In many developing economies, including LMI African countries, banks may mobilize deposits without efficiently channeling them into productive sectors such as manufacturing, agriculture, and small and medium-scale enterprises. Instead, funds may be diverted toward government securities, consumption lending, or low-productivity investments, thereby limiting their contribution to long-term economic growth. Furthermore, Demirgüç-Kunt and Levine (2008) noted that financial inclusion outcomes depend on both access and usage. In many African countries, deposit accounts may be concentrated among urban and higher-income populations, leaving rural and low-income groups financially excluded. As a result, deposit expansion may not translate into broad-based investment or inclusive economic growth.

In addition, weak institutional quality, inadequate regulatory oversight, and inefficiencies in the banking sector may contribute to the negative relationship observed. Thorsten Beck, Demirgüç-Kunt, and Maria Soledad Martínez Pería (2007) argued that when banking systems are inefficient, deposit mobilization may not lead to productive investment, thereby weakening its growth impact. According to Ozili (2022), the increasing use of mobile money, informal savings mechanisms, and digital financial platforms may reduce the economic relevance of traditional bank deposit accounts. Consequently, increases in deposit accounts within commercial banks may not fully capture actual financial inclusion or productive financial activity.

Despite the negative relationship, prior studies present mixed findings. For example, Kalu et al. (2019) and Thathsarani et al. (2021) reported a positive relationship between deposit mobilization and economic growth, while Nwaeze et al. (2024) also found that bank deposits positively influence economic performance in Nigeria. These differences may be explained by variations in institutional quality, financial sector development, regulatory frameworks, and methodological approaches. Theoretically, while endogenous growth theory suggests that

financial development enhances productivity and innovation, the present findings indicate that such benefits may not materialize in environments characterized by weak financial intermediation and inefficient resource allocation. Thus, although deposit accounts represent an important aspect of financial inclusion, their economic impact depends heavily on how effectively deposited funds are transformed into productive investments.

6. Conclusion and Policy Implications

This study examined the relationship between financial inclusion and economic growth in ten lower-middle-income (LMI) African countries over a 20-year period spanning 2004 to 2023. Economic growth was proxied by rGDP, proxies like the number of commercial bank branches per 100,000 adults, and the number of deposit accounts with commercial banks per 1,000 adults. Specifically, the number of commercial bank branches per 100,000 adults showed a negative and significant relationship with economic growth. The finding suggests that the costs associated with branch expansion, weak banking efficiency, or low productive utilisation of financial services may outweigh the expected growth benefits in some LMI African countries. The study also suggest that in LMI African countries, the expansion of commercial bank branches alone is insufficient to stimulate economic growth. Structural inefficiencies, weak financial intermediation, unequal branch distribution, high operational costs, and the growing transition toward digital financial systems may limit the effectiveness of branch expansion in promoting sustainable economic development.

Also, the number of deposit accounts with a negative and statistically significant relationship with economic growth. The finding shows that greater financial inclusion through mobilisation of deposit did not automatically translate into higher economic performance. Although enhanced deposits generally strengthen investment capacity, improve access to credit, enhanced mobilisation of savings, the effectiveness of these channels depends on how efficiently financial institutions allocate and mobilised funds to productive sectors of the economy. The result suggests that financial inclusion plays a significant role in promoting economic growth in LMI African countries. Both commercial bank branches, and deposit accounts contribute negatively to the economic growth.

The following recommendations are made based on the outcomes which included the expansion of commercial bank branches, particularly in rural and underserved areas should be of priority to the financial institutions, and government of these LMI Africa countries. Financial services access, reduction in geographical barriers, and promotion of inclusive economic participation will be improved by increased commercial banks branches networks. The development of digital financial services which should interest our policymakers, including mobile banking, agent banking, and Fintech solutions, considering high cost of establishing physical bank branches be taking into consideration. Financial education programs, enlightenment aimed to create, promoting awareness of banking products, among the citizens of these LMI countries in order to stimulate savings culture through effective and efficient utilization of financial services should be put in place by all financial institutions. Incentives for bank accounts opening, reduction in transaction costs, and support for small and medium enterprises (SMEs) are some policies of financial inclusion that ought to be put in place by our policymakers. A stable, reliable, and

efficient financial system requires strong regulatory oversight. Governments should strengthen. Banking regulations, financial stability, and promotion of transparency and accountability by government.

The findings of this research have numerous implications. The study's findings show negative relationship between financial inclusion proxies (deposit accounts, commercial bank branches) and the rGDP growth rate. Negative coefficients for commercial bank branches and deposit accounts carry vital policy implications for governments, fiscal and monetary authorities, and financial sector regulators. Expansion of banking infrastructure may unlikely to contributing effectively to productive economic activities. This situation likely to happen as a result of poor financial intermediation practices, excessive concentration of branches in non-productive areas, and operational inefficiencies. In particular, increasing in the number of bank branches only is insufficient to stimulate economic growth if financial resources are not efficiently allocated to productive sectors. Short-term consumer lending should be prioritize by commercial banks, government securities rather than financing productive sectors such as small-scale industries, agriculture, and manufacturing, and speculative investments.

Commercial bank branches are disproportionately concentrated in urban centers where banking services are already saturated, while rural and economically productive regions remain underserved. This uneven distribution limits the developmental impact of financial services and likely to widen regional inequalities. Governments and regulatory authorities should therefore develop policies that further balanced geographical distribution of banking services. Incentives for rural banking expansion and agricultural financing can assist to ensure that banking infrastructure contributes meaningfully to broad-based economic growth. Where branch expansion exceeds actual economic demand, banks may experience reduced profitability and inefficiency, which can negatively affect the overall financial system and economic growth. Financial institutions should adopt more efficient banking models by agency banking systems, mobile banking, and integrating digital banking technologies. Technological innovation to reduce the excessive dependence on costly physical branch expansion should be encouraged by policymakers.

Additionally, If increased deposits are not reinvested into productive economic activities, the economy likely to experience weak output expansion in spite of rising financial savings. Hence, Financial institutions efficiently intermediate savings into investments capable of generating employment, production, and income growth. In some cases, rising deposit accounts may coexist with low public confidence in the banking system due to poor financial returns, weak banking institutions, currency instability, and inflation. Under such conditions, deposit growth unlikely to support sustainable economic activities. This highlights the need for deposit insurance systems, inflation control, stronger macroeconomic stability, and effective financial sector regulation to maintain public trust and encourage productive financial participation.

In developing economies, financial inclusion policies sometimes result in large numbers of dormant or inactive accounts, particularly where accounts are opened to satisfy policy targets rather than genuine financial needs. Such accounts contribute little to economic growth and may distort the true effectiveness of financial inclusion policies. Quality and usage of financial services rather than merely increasing the number of accounts should be put in place by policymakers. Emphasis should be placed on active access to productive credit, savings

mobilization, digital payment adoption, and financial participation. The negative relationship between commercial bank branches, deposit accounts, and RGDP growth rate suggests that financial sector expansion may not automatically translate into economic growth when financial intermediation is inefficient and banking activities are weakly connected to productive sectors of the economy. Therefore, policymakers should prioritize improving banking sector efficiency, strengthening financial regulation, promoting productive sector lending, encouraging active financial participation, integrating digital financial technologies, enhancing financial literacy, and supporting real sector productivity.

This study makes several important contributions to the literature on financial inclusion and economic growth in LMI African countries which are unlike many prior studies that centre on global or upper-middle-income contexts, this study generally looks into financial inclusion determinants on the economic growth of LMI African countries between 2004 and 2023, thereby filling a significant gap in the regional literature; by making use of numbers of commercial bank branches per 100,000 adults (financial access) and deposit accounts at commercial banks per 1,000 adults (financial usage) as indicators, the study provides a nuanced in-depth knowledge of how different financial inclusion dimensions impact economic growth. Also, the McKinnon–Shaw hypothesis, Endogenous Growth Theory, and Financial Intermediation Theory were empirically supported by the findings, by demonstrating how financial access and usage contribute to savings mobilization, capital accumulation, and productivity improvements; and Financial access (bank branches) has a stronger and more immediate effect on growth than usage (deposit accounts) as shown in the study, highlighting structural challenges such as low financial literacy, dormant accounts, and income constraints in LMI African economies.

6.1. Limitations and future research direction:

Having provided valuable insights, several limitations should be acknowledged such as incomplete or inconsistent data were seen in some countries which could affect precision of financial inclusion and GDP outcomes of these LMI Africa countries under study; Informal savings groups, cooperative societies, or mobile money platforms, which are prevalent in African economies were not taking into consideration while the study only focuses on formal banking indicators (branches and deposit accounts) for the study; even though the study acknowledges digital finance as a complementary factor, detailed metrics on fintech adoption and mobile banking penetration were not included in the study as result of data constraints; the relationship between financial inclusion and economic growth may be bidirectional; while system GMM helps address endogeneity, causality cannot be fully established; and institutional quality, regulatory environments, and socio-economic conditions vary across the ten LMI African countries, which may influence the generalizability of results. Future studies can expand analysis to include high-income countries, upper-middle-income, lower-middle-income, and low-income, or conduct comparative regional studies across Asia, sub-Saharan Africa, and Latin America, to determine whether the observed relationships are globally consistent or context-specific; Incorporating broader measures for further study such as indices of financial literacy, digital payment systems, usage of mobile money usage, adoption of fintech, internet banking penetration, and provision of a more broad assessment of financial inclusion; and How financial inclusion influences specific sectors of the economy can be looked into by future studies which include services, manufacturing, and agriculture, rather than relying mainly on aggregate GDP

growth. Future research could explore whether financial inclusion has non-linear effects on economic growth, including threshold levels beyond which additional financial inclusion likely to have diminishing or negative returns, as well as generally assessing fintech innovations effects, digital wallets, and mobile banking platforms, on economic growth and financial inclusion outcomes, given the rapid growth of digital finance in Africa.

Data availability statement

Available upon reasonable request.

‘Clinical trial number: not applicable.’

References

- Adedokun et. al.(2022). An investigation of the impact of financial inclusion on economic growth: Evidence from African Countries. *Asian Economic and Financial Review*. ISSN(e): 2222-6737ISSN(p): 2305-2147. DOI: 10.55493/5002.v12i10.4631. 12(10), 864-885. AESS Publications. URL: www.aessweb.com
- Agnello, L., Mallick, S. K., & Sousa, R. M. (2012). Financial reforms and income inequality. *Economics Letters*, 116(3), 583–587. <https://doi.org/10.1016/j.econlet>.

- Aguirregabiria, V., Robert Clark, R., & Hui Wang, H. (2024). The geographic flow of bank funding and access to credit: Branch networks, local synergies and competition. arXiv. <https://doi.org/10.48550/arXiv.2407.03517>
- Adusei, M. (2013). Finance-growth nexus in Africa: A panel generalized method of moments (GMM) analysis. *Asian Economic and Financial Review*, 3(10), 1314–1324.
- Allen, F., Carletti, E., Cull, R., Qian, J., Senbet, L., & Valenzuela, P. (2012). The African financial development and financial inclusion nexus. *Journal of African Economies*, 21(1), i13–i51. <https://doi.org/10.1093/jae/ejr037>
- Andersen, T. B., & Tarp, F. (2003). Financial liberalization, financial development and economic growth in LDCs. *Journal of International Development*, 15(2), 189–209. <https://doi.org/10.1002/jid.971>
- Baltagi, B. H. (2021). *Econometric analysis of panel data* (6th ed.). Springer.
- Beck, T., Demirgüç-Kunt, A., & Levine, R. (2007). Finance, inequality, and poverty: Cross-country evidence. *Journal of Economic Growth*, 12(1), 27–49. <https://doi.org/10.1007/s10887-007-9010-6>
- Bello, O.A.(2014). The role of data analytics in enhancing financial inclusion in emerging economies. *International Journal of Developing and Emerging Economies*, 11(3), 90-112.
- Central bank of Nigeria (2024) National financial inclusion strategy. Summary report.
- Chatterjee, A. (2020). Financial inclusion, information and communication technology diffusion, and economic growth: a panel data analysis. *Information Technology for Development*, 26(3), 607-635.
- Chima, M.M., Babajide, A.A., Adegboye, A., Kehinde, S., & Fasheyitan, O.(2021). The relevance of financial inclusion on sustainable economic growth in Sub-Saharan African nations. *Sustainability*, 13(10), 5581.
- Demirgüç-Kunt, A. & Klapper, L.(2013). Measuring financial inclusion: Explaining variation in use of financial services across and within countries. *Brookings Papers on Economic Activity*, (1), 279–340.
- Domar, E. D. (1946). Capital Expansion, Rate of Growth, and Employment. *Econometrica*, 14(2), 137–147. <https://doi.org/10.2307/1905364>
- Erlando, A., Riyanto, F. D., & Masakazu, S. (2020). Financial inclusion, economic growth, and poverty alleviation: evidence from eastern Indonesia. *Heliyon*, 6(10).
- Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics* (5th ed.). McGraw-Hill.
- Hassouba, M. (2023). Financial inclusion and economic growth: Evidence from Egypt. *International Journal of Economics and Finance Studies*, 15(2), 45–62. <https://doi.org/10.34109/ijefs.2023.15.2.5>
- Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica*, 46(6), 1251–1271. <https://doi.org/10.2307/1913827>
- Ifediora, C., et al. (2022). Financial inclusion and its impact on economic growth: Evidence from SSA. *Cogent Economics & Finance*.

- Inoue, T., & Hamori, S. (2016). Financial access and economic growth: Evidence from Sub-Saharan Africa. *Emerging Markets Finance and Trade*, 52(3), 743–753. <https://doi.org/10.1080/1540496X>.
- Inoue, T., & Hamori, S. (2016). The impact of financial inclusion on economic growth: Empirical evidence from Asia. *Asian Economic Journal*, 30(2), 179–198. <https://doi.org/10.1111/asej.12084>
- Kamara, A. K., & Baorong Yu, B. (2024). The impact of FinTech adoption on traditional financial inclusion in Sub-Saharan Africa. *Risks*, 12(7), 115. <https://doi.org/10.3390>
- Kim, D. W., Yu, J. S., & Hassan, M. K. (2024). Financial inclusion, digital technology, and economic growth. *Research in International Business and Finance*, 70, 102361.
- Kilimvi, A. S., & Ezekwesiri, A. S.(2023). Impact of financial inclusion on economic growth of African countries. *American Journal of Accounting*, 5(1), 15–33. <https://doi.org>
- International Monetary Fund. (2024). Financial Access Survey (FAS). <https://data.imf.org>
- Kalu, C. U., Okafor, F. O., & Nwogugu, M. (2019). Bank deposits and economic growth in developing economies. *International Journal of Economics and Financial Issues*, 9(3), 123–130.
- Kim et al. (2018). Financial inclusion proxies including deposit accounts per 1,000 adults.
- Lai, K.P.(2023). Financial geography I: The state-finance nexus. *Progress in Human Geography*, 47(4), 591-603.
- Levine, R.(1997). Financial development and economic growth: Views and agenda. *Journal of Economic Literature*, 35(2), 688–726.
- Liu, G., Huang, Y., & Huang, Z. (2021). Determinants and mechanisms of digital financial inclusion development: Based on urban-rural differences. *Agronomy*, 11, 1833. <https://doi.org/10.3390/agronomy 11091833>.
- Marodza, M.(2023). Digital financial inclusion and human development in Zimbabwe: An Analytical Review 2011-2021 (Doctoral dissertation, Great Zimbabwe University).
- Maruta, A. A., Edjigu, H.T. & Kassa,W.(2023). Effect of financial inclusion on women's empowerment. *Economic Notes*. 52(3),1-29.
- Mckinnon, R. I. (1973). Money and capital in economic development. Brookings Institution Press.
- Menyelim, C., Babajide, A., Omankhanlen, A., & Ehikioya, B. (2021). Financial inclusion, income inequality and sustainable economic growth in sub-Saharan African countries. *Sustainability*, 13,1780.
- Mostafa, S., Ashraf, S. E., & Marwa, E.(2023). The impact of financial inclusion on economic development. *International Journal of Economics and Financial Issues*, 13(2), 93–101. <https://doi.org/10.32479/ijefi.14107>.

- Naceur, S. B., & Ghazouani, S. (2007). The determinants of stock market development in the Middle-Eastern and North African region. *Managerial Finance*, 33(7), 477–489. <https://doi.org/10.1108/03074350710753206>
- Nanda, K., & Kaur, M. (2016). Financial inclusion and human development: A cross-country evidence. *Management and Labour Studies*, 41(2), 127–153.
- Nguyen, T. T. H. (2021). Measuring financial inclusion: A composite financial inclusion index for developing countries. *Journal of Economics and Development*, 23(1), 77-99. <https://doi.org/10.1108/JED03-2020-0027>
- Nizam, R., Karim, Z.A., Rahman, A.A., & Sarmidi, T.(2020). Financial inclusiveness and economic growth: New evidence using a threshold regression analysis. *Economic research-Ekonomska istraivanja*, 33(1), 1465-1484.
- Nwaeze, C., Michael, O. and Nwabekee, C.E. (2024). Financial intermediation and economic growth in Nigeria (1992-2011). *The Macrotheme Review*, 3(6), 124-142.
- Nwisiyenyi, K. J., Obi, C. O., & Mazeli, P. E. (2020). Bank credit and economic growth in developing economies. *Journal of Economics and Sustainable Development*, 11(4), 45–53.
- Pazarbasioglu, C., Mora, A., Uttamchandani, M., Natarajan, H. Feyen, E. and Saal, M. (2020). Digital Financial Services. World Bank Group .
- Ramkumar, G. (2017). A study on benefits of financial inclusion and cashless economy for India. *EPRA International Journal of Business and Economic Review*, 5(8), 182–186
- Nwafor, M.C. (2018). The nexus between financial inclusion and economic growth: Evidence from Nigeria. *International Journal of Science and Innovation in Social Science*, 2(4).
- Onaolapo, A. R., & Ajose, K. G. (2019). Banking sector development and economic growth in Nigeria (1981-2016). *Fountain University Osogbo Journal of Management*, 4(2).
- Ozili, P.(2022). Financial inclusion and sustainable development: an empirical association. *Journal of Money and Business*, 2(2), 186-198. Emerald publishing limited e-ISSN: 2634-260X p-ISSN: 2634-2596 DOI 10.1108
- King, R.G. & Levine, R (1993). Finance and growth: Schumpeter might be right. *The Quarterly Journal of Economics*, 108(3), 717–737.
- Sahay, R., Čihák, M., N'Diaye, P., Barajas, A., Mitra, S., Kyobe, A., Mooi, Y. N., & Yousefi, S. R. (2015). Financial Inclusion: Can It Meet Multiple Macroeconomic Goals? IMF Staff Discussion Note.
- Schumpeter, J. (1911), *The theory of economic development*. Cambridge, Mass: Harvard University Press.
- Sharma, D. (2019). "Nexus between financial inclusion and economic growth: Evidence from the emerging Indian economy," *Journal of Financial Economic Policy*, 8,(1), 13-36.

- Srouji, J. (2020). Digital payments, the cashless economy, and financial inclusion in the United Arab Emirates: Why is everyone still transacting in cash? *Journal of Risk and Financial Management*, 13(11), 1–10. <https://doi.org/10.3390/jrfm13110260>
- Thathsarani, U. S., Wei, J. & Samaraweera, G. R. S. R. C. (2021). Financial inclusion's role in economic growth and human capital in South Asia: An econometric approach. *Sustainability*, 13(8), 4303.
- Van, D.T.T. and Linh, N.H.(2019). The impacts of financial inclusion on economic development: cases in Asian-Pacific countries.
- Van, P., & Lihn, N. (2019). Financial inclusion and economic growth: Empirical evidence from Vietnam. *Journal of Asian Finance, Economics and Business*, 6(2), 129–138. <https://doi.org>
- Yakubi, Y., Basuki, B., Purwono, R. and Usman, I. (2023). The impact of digital financial inclusion. On Socio-Economic Development In Low-Income Countries.
- World Bank (2024). Commercial bank branches (per 100,000 adults). World Development Indicators <https://data.worldbank.org/indicator/FB.CBK.BRCH.P5>
- World Bank (2024). GDP growth (annual %). Retrieved from <https://data.worldbank.org>
- World Bank (2024). Outstanding loans per 1,000 adults. World Development Indicators. <https://databank.worldbank.org>
- World Bank (2024). G20 financial inclusion indicators glossary. <https://databankfiles.worldbank.org>
- Yakubi, Y., Basuki, B., Purwono, R., & Usman, I.(2023). The impact of digital financial inclusion. On Socio-Economic Development In Low-Income Countries. <https://www.researchgate.net>