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The Role of Financial Literacy in Enhancing the Impact of Financial Inclusion on Economic Growth Among Sub-Saharan Africa Countries

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ABSTRACT

This study investigates the role of financial literacy in shaping the relationship between financial inclusion and economic growth across 49 Sub-Saharan African (SSA) countries over the period 2003 to 2023. The primary objective is to evaluate whether financial literacy enhances the impact of financial inclusion on economic performance. Specifically, the study examines three dimensions: the direct effect of financial inclusion on growth, the moderating influence of financial literacy, and the direct contribution of financial literacy to economic expansion. Employing a quantitative research design, the study uses Generalized Method of Moments (GMM) dynamic panel estimations to address issues of endogeneity and reverse causality. Secondary data were sourced from global databases including the World Bank, IMF, and Klapper and Lusardi's (2020) financial literacy indicators. Variables such as inflation, unemployment, trade openness, and institutional quality were controlled for, ensuring robust empirical estimation. The findings reveal that financial inclusion alone does not significantly enhance economic growth in the absence of adequate financial literacy. However, when financial literacy is introduced as a moderator, the interaction term exhibits a significant and positive relationship with growth. Additionally, financial literacy by itself is also found to positively influence growth outcomes. These results have profound implications for financial sector policy, indicating that financial capability must be built alongside access. Thus, policymakers are encouraged to integrate financial literacy into national financial inclusion strategies, ensuring that economic empowerment efforts are both inclusive and transformative.

Keywords: Financial Literacy, Financial Inclusion, Economic Growth, Sub-Saharan Africa, GMM, Panel Data, Institutional Quality, Dynamic Models.

INTRODUCTION

In recent years, the twin concepts of financial inclusion and financial literacy have attracted increased attention in policy, academic, and development discourses, especially within developing regions such as Sub-Saharan Africa (SSA). These concepts have been widely promoted as mechanisms through which low-income populations can be integrated into formal

economic systems, thereby catalyzing inclusive economic growth. However, despite ongoing financial inclusion reforms, several Sub-Saharan African countries continue to experience sluggish economic performance, raising critical questions about the effectiveness of these initiatives in isolation. While financial inclusion is often conceptualized as access to and use of formal financial services, financial literacy refers to the capacity of individuals to understand and utilize those services effectively (Klapper & Lusardi, 2020). Thus, the interplay between the two may hold the key to unlocking sustainable development outcomes.

In order to better understand this dynamic, this study seeks to explore the role of financial literacy in enhancing the growth outcomes of financial inclusion across selected SSA countries. This inquiry is particularly timely, given the mounting empirical and theoretical evidence suggesting that financial access, without sufficient user capability, may lead to suboptimal financial decision-making and unintended macroeconomic consequences (Bongomin et al., 2018). As such, this investigation moves beyond simplistic models of inclusion and considers the cognitive and behavioral dimensions that may condition its effectiveness.

Financial inclusion refers to the availability, accessibility, and usage of affordable financial products and services by all segments of the population, especially the underserved and marginalized. It encompasses access to credit, savings, insurance, and payment systems that are delivered responsibly and sustainably (Van et al., 2021). Financial literacy, on the other hand, is defined as the ability to understand and effectively use various financial skills, including personal financial management, budgeting, and investing (Khan et al., 2022). According to Klapper and Lusardi (2020), financially literate individuals are better equipped to evaluate financial products, avoid over-indebtedness, and engage with formal financial systems confidently.

The intersection of financial inclusion and literacy is critical. While financial inclusion facilitates access, financial literacy ensures that access translates into optimal usage. As Iftikhar et al. (2024) argue, inclusion without literacy can lead to misuse of financial services, such as high default rates or inadequate savings behavior. Conversely, high financial literacy in the absence of access results in underutilization of financial opportunities. Hence, their synergy is essential for driving economic outcomes at both the micro and macro levels.

Historically, financial inclusion has been positively associated with economic growth, primarily through channels such as increased savings mobilization, investment stimulation, and resource allocation efficiency. Theoretically rooted in financial intermediation theory (Boyd, 2010), the premise is that when more people and firms are connected to formal finance, there is greater scope for productive economic activities. In SSA, however, this link has yielded mixed empirical outcomes. For example, Obayori (2020) found no significant impact of financial inclusion on growth in Nigeria, citing low penetration of credit among rural and informal populations.

Other scholars have expressed concern about the quality and depth of inclusion in SSA. Okoye et al. (2017) emphasized that mere access to accounts does not equate to meaningful participation in the financial system. Many inclusion programs in SSA tend to be top-down and fail to address the structural and behavioral barriers facing low-income groups. Moreover, informal finance continues to dominate the region, limiting the economic transformation

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potential of formal inclusion efforts. Additionally, SSA faces infrastructural deficits—particularly in digital finance systems—that further hinder the effectiveness of inclusion. Although mobile banking has expanded reach, many users still lack the knowledge and trust to engage meaningfully with these platforms (Alnabulsi & Salameh, 2021). Hence, while financial inclusion may be necessary, it is far from sufficient to stimulate growth unless paired with broader financial ecosystem reforms and capacity-building efforts.

The concept of financial literacy as a moderating factor in the inclusion-growth nexus is gaining traction in development economics. Financial literacy not only improves personal financial decision-making but also enables individuals to engage more meaningfully with financial institutions and products. This enhanced engagement, in turn, could boost the effectiveness of financial inclusion in driving economic growth (Bongomin et al., 2018). Recent empirical studies have shown that financial literacy can amplify the positive effects of financial inclusion by reducing information asymmetries and enabling rational financial behavior. For instance, Khan et al. (2022) observed that financial literacy significantly improves the impact of financial inclusion on household investment and savings in emerging markets. Similarly, Bustami & Saifrizal (2022) demonstrated that financial knowledge improves entrepreneurial outcomes when paired with Islamic fintech in Indonesia. These findings suggest that the benefits of financial inclusion can only be fully realized when the population has the cognitive tools to navigate financial landscapes.

In SSA, where financial literacy levels remain low, the moderating role of literacy becomes even more vital. Klapper and Lusardi (2020) highlighted that most SSA countries scored below the global average in financial literacy, yet these countries continue to push aggressive financial inclusion agendas. Without sufficient education or institutional trust, such efforts may yield weak or counterproductive results. Therefore, this study hypothesizes that financial literacy significantly conditions the inclusion-growth relationship across the region.

The direct effect of financial literacy on economic growth has also been a focal point in recent research. On the individual level, financially literate citizens tend to exhibit better savings behavior, debt management, and investment decisions. At the aggregate level, these behaviors translate into higher capital formation, improved productivity, and more stable macroeconomic environments (Didenko et al., 2023). Vovchenko et al. (2018) argue that financially literate populations enhance the efficiency of capital markets and reduce systemic financial risk. Nevertheless, the evidence from SSA remains inconclusive. In some cases, financial literacy has had no direct effect on growth, largely due to institutional constraints and underdeveloped financial markets. For example, Saeed et al. (2024) showed that financial literacy had no significant effect on macroeconomic performance in Pakistan unless mediated by strong social capital and regulatory frameworks. Similarly, Refera et al. (2016) critiqued the Western bias in financial education models exported to Africa, noting their poor contextual fit. Thus, this study re-examines the direct literacy-growth link in SSA using recent panel data and robust econometric techniques. It aims to clarify whether financial knowledge independently spurs growth, or whether it must operate in conjunction with access, trust, and infrastructure to yield results.

This study addresses several important research gaps. First, while there is extensive global literature on financial inclusion and literacy, few studies have explicitly analyzed their interaction in the context of SSA. Second, much of the existing SSA research is limited to country-level case studies and lacks regional generalization. This study employs a panel dataset across 20 SSA countries from 2003 to 2023, thereby enhancing its external validity. Third, the existing literature often treats inclusion and literacy as exogenous, ignoring potential endogeneity issues. This study uses Generalized Method of Moments (GMM), a dynamic panel estimator that corrects for autocorrelation and endogeneity. Furthermore, it introduces interaction terms and includes key institutional variables such as regulatory quality and governance indicators to test for conditional effects. Finally, the study fills a gap in variable operationalization, offering an integrated framework that incorporates financial behavior (literacy), access (inclusion), and enabling environment (institutional quality). This multidimensional approach provides a more accurate picture of the mechanisms through which financial systems affect growth.

Given the persistent economic underperformance of many Sub-Saharan African nations despite ongoing financial inclusion reforms, there is a compelling need to understand what conditions are necessary for inclusion to translate into growth. This study is therefore essential to identify whether financial literacy enhances the developmental potential of financial inclusion, especially in contexts with weak institutions and limited infrastructure. It examines this question using quantitative methods and dynamic panel data techniques across a region that remains underrepresented in global development research. The first aim of this study is to determine the extent to which financial inclusion independently influences economic growth in SSA. The second objective is to assess whether financial literacy moderates this relationship and under what conditions. Finally, the study explores whether financial literacy on its own can drive economic outcomes in the absence of broad access to financial services. Together, these objectives offer a more nuanced understanding of how financial systems contribute to macroeconomic performance in a region poised for transformation.

THEORETICAL FRAMEWORK

Understanding the complex interplay between financial inclusion, financial literacy, and economic growth requires a firm grounding in economic and behavioral theory. Two prominent theoretical lenses frame this study: Human Capital Theory and Financial Intermediation Theory. Both theories provide robust explanatory frameworks for assessing how individuals' knowledge and institutional structures shape economic performance in SSA countries. Human Capital Theory underscores the pivotal role of knowledge acquisition—such as financial literacy—in enhancing productivity and decision-making at both individual and national levels (Wuttaphan, 2017).

Meanwhile, Financial Intermediation Theory highlights the mechanisms by which financial systems allocate capital, reduce information asymmetry, and facilitate economic activity (Boyd, 2003; Molnár, 2018). Together, these theories support the central hypothesis of this study: that financial literacy enhances the effectiveness of financial inclusion in driving economic growth. While financial systems provide the infrastructure for access, it is human capability—rooted in financial knowledge—that determines the productive use of such systems. Therefore, both

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frameworks complement each other in explaining the dynamics that this research seeks to investigate.

Human Capital Theory

Human Capital Theory, introduced by economists such as Gary Becker and Theodore Schultz, posits that individuals' knowledge, education, and skills are forms of capital that contribute to productivity and economic growth (Almendarez, 2011; Gillies, 2015). Within this paradigm, financial literacy is a specific subset of human capital, representing the cognitive and decision-making skills that individuals use to manage money, plan for the future, and engage with financial systems (Tan, 2014). Applied to the SSA context, where formal education and financial awareness remain limited in several countries, the absence of this form of capital can hinder meaningful economic participation.

Financial literacy, as a human capital investment, produces both private and public returns. At the individual level, it leads to more informed financial behavior—better saving habits, effective debt management, and wise investment choices (Klapper & Lusardi, 2020). At the national level, these micro-decisions aggregate into macroeconomic outcomes, such as higher levels of domestic investment, improved financial stability, and greater resilience to economic shocks (Vovchenko et al., 2018). For instance, Bongomin et al. (2018) argue that financial literacy not only supports financial inclusion but also enhances individuals' capacity to utilize financial services effectively, especially in low-income, rural African communities. However, Human Capital Theory is not without limitations. Critics like Marginson (2019) argue that the theory overemphasizes individual agency while underestimating structural constraints such as institutional inequality, policy failure, and regional disparities. In the SSA region, for instance, systemic issues—ranging from weak governance to fragmented financial regulation—may limit the potential returns on financial education, regardless of individual capabilities. Furthermore, Tan (2014) emphasizes that not all forms of knowledge automatically translate into economic productivity, suggesting the need for context-specific learning that addresses financial behavior in real-world settings.

Despite these criticisms, the theory remains instrumental in framing the value of financial literacy as a developmental tool. As Holden and Biddle (2017) note, its integration into education and policy design has transformed how nations conceptualize investments in human potential. Within this study, Human Capital Theory provides a compelling rationale for investigating whether financial literacy—understood as a form of socio-economic empowerment—can moderate and strengthen the impact of financial inclusion on economic growth. Moreover, the theory offers an empirical foundation for measuring literacy outcomes. Financial knowledge, much like formal education, can be quantified, benchmarked, and compared across countries (Galiakberova, 2019). By using data from Klapper and Lusardi (2020), the study leverages standardized literacy scores to assess how variations in human capital influence macroeconomic performance across SSA countries from 2003 to 2023.

Financial Intermediation Theory

Financial Intermediation Theory addresses the critical role that financial institutions play in mobilizing savings, allocating capital, and mitigating risk in an economy. Developed by Gurley and Shaw (1960) and later expanded by McKinnon and Shaw (1973), the theory holds that

efficient intermediation channels capital from surplus to deficit units, enabling productive investment and, ultimately, economic growth (Boyd, 2003). In this sense, financial inclusion—by connecting individuals to banks, microfinance institutions, and digital platforms—is an extension of the financial intermediation process. In Sub-Saharan Africa, and particularly within SSA, financial intermediaries have evolved from traditional banks to include fintech firms and mobile money operators. This evolution has helped bypass infrastructural barriers, reaching populations previously excluded from formal finance (Bongomin et al., 2021). However, as Molnár (2018) notes, the success of this new wave of intermediation depends not only on access but also on the quality of engagement—how well users understand, trust, and use these financial tools. Here, the intersection with financial literacy becomes evident. Bethune et al. (2022) argue that financial intermediation is fundamentally an information-based process, wherein knowledge asymmetry can lead to suboptimal outcomes such as default, fraud, or financial exclusion. In this light, financial literacy helps reduce information gaps between institutions and clients, making intermediation more efficient and impactful. When users can critically assess interest rates, evaluate loan terms, and plan repayments, the intermediation process functions more effectively—boosting overall financial sector performance and stimulating economic growth.

Yet, the theory also recognizes structural inefficiencies. Philippon (2015) raises concerns about declining efficiency in financial intermediation, particularly when the cost of intermediation exceeds the value it creates. In low-literacy environments, financial products may be misused or misunderstood, leading to over-indebtedness and market failures. This reinforces the study's hypothesis that financial literacy must complement financial inclusion for the latter to yield sustainable economic benefits. Furthermore, Mitchell (2004) highlights that modern financial intermediation increasingly relies on complex, digital platforms. This shift implies that traditional metrics of access are no longer sufficient; users must also possess digital financial literacy to navigate fintech ecosystems effectively. In SSA countries, where mobile finance has grown rapidly, this insight adds another layer of relevance to the theoretical framework.

Financial Intermediation Theory also supports the study's methodological approach. By examining the interaction between access (inclusion) and capability (literacy) over time, the theory justifies the use of panel regression models to uncover causal relationships and mediating effects. It enables the study to go beyond simple correlations and explore the mechanisms by which financial systems and human behavior jointly influence economic outcomes. Together, Human Capital Theory and Financial Intermediation Theory provide a multi-dimensional theoretical foundation for this study. While the former emphasizes the importance of financial literacy as an investment in human development, the latter highlights how financial systems translate that capability into economic value. The synergy between these theories strengthens the rationale for analyzing how financial literacy moderates the link between inclusion and growth, especially in a region like SSA where both structural and behavioral barriers to development persist.

METHODS

Data Collection

This study employs a quantitative research approach, focusing exclusively on secondary data to examine the relationship between financial literacy, financial inclusion, and economic

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growth among Sub-Saharan African (SSA) countries over the period 2003 to 2023. The quantitative methodology is ideal for identifying statistical patterns, testing hypotheses, and inferring causality between macroeconomic variables across time and countries (Iftikhar et al., 2024). Relying on reputable and standardized data enhances the credibility and comparability of results, especially within the context of regional economic research.

Data on economic growth, measured by annual GDP per capita growth (%), as well as macroeconomic controls such as inflation rate and unemployment rate, were sourced from the World Bank's World Development Indicators (WDI). Measures of financial inclusion—such as the proportion of adults with formal accounts or mobile money usage—were extracted from the Global Findex Database and the IMF's Financial Access Survey (FAS). To account for financial capability, cross-country financial literacy rates were drawn from the standardized global dataset provided by Klapper and Lusardi (2020), which reports the percentage of adults who answered at least three out of five financial knowledge questions correctly. Furthermore, regulatory quality, a key institutional variable, was obtained from the Worldwide Governance Indicators (WGI) dataset, following the precedent set by Hussain et al. (2021). Additionally, the Human Development Index (HDI) and trade openness metrics were sourced from Our World in Data and UNDP reports. This diverse and reliable set of secondary data sources ensures robust model specification and accurate policy inference.

Sample Population

The dataset initially comprised all 49 Sub-Saharan African (SSA) countries, encompassing a diverse range of political, institutional, and economic systems. However, after accounting for data completeness across all variables and the 21-year study window (2003–2023), a final sample of 36 countries was retained for the analysis. This subset was determined based on the availability of continuous and harmonized macroeconomic and governance data, particularly for the financial literacy index, which is often limited in temporal coverage across SSA nations (Khan et al., 2022).

Importantly, the retained countries are representative of the SSA region's diversity in terms of income classification, institutional capacity, and levels of financial development. This ensures the generalizability of findings while minimizing selection bias. The inclusion of countries such as Nigeria, Ghana, Kenya, South Africa, and Tanzania—economically and demographically significant nations—strengthens the robustness of the cross-country comparisons. In line with recent empirical literature emphasizing regional financial dynamics, focusing on the SSA bloc also provides a relevant context for policy-oriented insights (Azimi, 2022; Okoye et al., 2017).

Measures

Each variable in the study is operationalized using internationally accepted definitions and measurement standards. The dependent variable, economic growth (EG), is measured by annual GDP per capita growth rate (%), sourced from the World Bank. The primary independent variable, financial inclusion (FI), is captured through indicators such as the percentage of adults with formal financial accounts and mobile money usage, obtained from Global Findex and IMF FAS data. The key moderating variable, financial literacy (FL), is measured by the percentage of adults answering at least three out of five financial knowledge questions correctly, as reported in Klapper & Lusardi (2020). Although cross-sectional in

nature, this indicator provides a standardized basis for inter-country comparison. Control variables include Inflation Rate (INF), Unemployment Rate (UNEMP), and Trade Openness (TO), each measured as annual percentage changes or ratios to GDP (Van et al., 2021). Additionally, Regulatory Quality (RQ)—drawn from the WGI—and Human Development Index (HDI)—from UNDP reports—are included to account for institutional and socio-economic contexts.

Table 1: Measurements of Variables

Variable	Definition	Acronym	Measurement	Data Source
Economic Growth	Increase in the inflation-adjusted value of goods and services produced	EG	GDP per capita growth rate (%) or real GDP growth rate	World Bank World Development Indicators (WDI)
Financial Inclusion	Access and use of formal financial services by individuals and firms	FI	% of adults with bank or mobile money accounts, ATMs per 100,000 adults	World Bank Global Findex (2011, 2014, 2017, 2021), IMF Financial Access Survey
Financial Literacy	Understanding of basic financial concepts and ability to make informed decisions	FL	% of adults answering at least 3 out of 5 financial questions correctly	Klapper & Lusardi (2020), *Financial Management*, 49(3), 589–614 (DOI link)
Inflation Rate	Rate at which the general level of prices for goods and services is rising	INF	Annual % change in Consumer Price Index (CPI)	World Bank WDI
Unemployment Rate	Proportion of the labor force that is without work but available and seeking employment	UNEMP	Total unemployment (% of total labor force)	World Bank WDI
Trade Openness	Degree of a country's integration into the global economy	TO	Sum of exports and imports as % of GDP	Our World in Data
Institutional Quality	Strength of regulatory systems and government capacity to support private sector development	REG_QUAL	Regulatory Quality index (ranges from -2.5 to +2.5; higher values indicate better regulatory quality)	World Bank Worldwide Governance Indicators (WGI)
Human Development	Composite index of health, education, and standard of living	HDI	Human Development Index (0 to 1 scale; higher is better)	Our World in Data

Model for the Study

The study adopts a panel data regression model to test the relationships between the variables across both time and countries. Panel data is advantageous in capturing both temporal dynamics and individual country characteristics, thereby reducing omitted variable bias and enhancing estimation precision (Bethune et al., 2022). To examine the direct relationship between financial inclusion and economic growth, and the moderating effect of financial literacy, the study follows prior empirical modeling frameworks used by Bongomin et al. (2018) and Saeed et al. (2024). Additionally, fixed and random effects models are considered to control for unobserved heterogeneity.

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Model Specification:
The study specifies the following baseline and interaction models:

Model 1: Direct Effect of Financial Inclusion:

$$EG_{it} = \beta_0 + B_1 FI_{it} + B_2 X_{it} + \mu_i + \epsilon_{it} \quad \text{(1)}$$

Model 2: Moderating Role of Financial Literacy:

$$EG_{it} = \beta_0 + B_1 FI_{it} + B_2 FL_i + B_3 (FI_{it} \times FL_i) + B_2 X_{it} + \mu_i + \epsilon_{it} \quad \text{(2)}$$

Model 3: Direct Effect of Financial Literacy:

$$EG_{it} = \beta_0 + B_1 FL_i + B_2 X_{it} + \mu_i + \epsilon_{it} \quad \text{(3)}$$

Where:

- EG_{it} = Economic growth in country *i* at time *t*.
- FI_{it} = Financial inclusion.
- FL_{it} = Financial Literacy.
- X_{it} = Vector of control variables (INF, UNEMP, TO, RQ, HDI)
- ϵ_{it} is the error term.
- μ_i = Country-specific effect.

Analytical Techniques
The study applies a multi-step quantitative analytical strategy in order to thoroughly investigate the relationship between financial inclusion, financial literacy, and economic growth in SSA countries, the first phase involves conducting descriptive statistics to summarize the central tendency and dispersion of each variable. This includes the mean, standard deviation, minimum, and maximum values, offering insights into the variability of financial and macroeconomic indicators across the 2003–2023 period (Saeed et al., 2024).

Following this, correlation analysis is used to assess the strength and direction of linear relationships between the independent, moderating, and dependent variables. However, recognizing that correlation does not imply causation, the study proceeds with more robust inferential techniques. A stationarity test, particularly the Levin-Lin-Chu and Im-Pesaran-Shin unit root tests, is performed to ensure that the panel data do not exhibit trends that could distort regression estimates (Bethune et al., 2022).

Furthermore, to validate the model's appropriateness, specification tests—including the Hausman test—are employed to choose between fixed effects and random effects regression frameworks. Additionally, multicollinearity is checked using the Variance Inflation Factor (VIF), ensuring that independent variables are not excessively correlated (Molnár, 2018). To address potential violations of homoscedasticity, a Breusch-Pagan/Cook-Weisberg test for heteroskedasticity is applied. Finally, the core analysis is performed through panel regression models, estimating direct and interaction effects to test both the primary and moderating hypotheses (Bongomin et al., 2021).

Data Quality Measures

It is essential for producing valid findings by ensuring the integrity and reliability of the dataset. First, all variables are derived from standardized, internationally recognized secondary sources, including the World Bank, Our World in Data, and UNDP, which reduces measurement bias and enhances comparability (Azimi, 2022). Next, data cleaning procedures—such as handling missing values, normalizing cross-sectional indicators, and forward-filling country identifiers—were implemented to prevent structural inconsistencies. Moreover, by aligning all country-year observations within a balanced panel structure, the study mitigates the risks associated with irregular or missing data points (Van et al., 2021). Cross-checking values from multiple sources—such as verifying Global Findex data against IMF Financial Access Surveys—further enhances reliability. Finally, assumptions of normality and variance stability were addressed using preliminary diagnostic plots and formal tests, ensuring that the dataset meets the preconditions for regression modeling. Through these meticulous procedures, the study maintains high data quality, thereby reinforcing the credibility of its econometric conclusions.

RESULTS

Descriptive Statistics

The descriptive statistics presented in Table 2 offer a valuable snapshot of the macroeconomic and financial indicators across 408 observations from Sub-Saharan African countries between 2003 and 2023. The average economic growth rate of approximately 2.31% suggests modest economic performance across the region during the study period. However, the large standard deviation (3.54) and the wide range (from -22.31% to 19.51%) indicate significant fluctuations, reflecting the volatility typical of emerging economies. Notably, the negative skewness and high kurtosis highlight the presence of outliers—especially sharp economic contractions in some countries. Meanwhile, the average financial inclusion rate of 29.7% remains relatively low, suggesting persistent barriers to access within formal financial systems. The relatively moderate standard deviation (0.19) indicates some variation across countries, and the right-skewed distribution reflects progress made by a few countries while others still lag. In contrast, the financial literacy index, with a mean of 34.18%, further underscores knowledge gaps that may undermine informed financial decision-making. The fairly normal distribution of this variable, with slight negative skewness, suggests a relatively balanced dispersion of literacy levels.

Furthermore, variables such as inflation rate exhibit extreme skewness and kurtosis (skewness = 14.54, kurtosis = 241.57), confirming the presence of hyperinflationary episodes in a few economies, while most remained relatively stable. Similarly, institutional quality ranges widely from -2.00 to over 7.22, with highly positive skewness, indicating that most countries still operate under weak institutional environments, though a few demonstrate relatively robust governance. Trade openness appears normally distributed but varies substantially, reflecting diverse trade policies and economic structures. Altogether, the descriptive statistics indicate substantial heterogeneity across the sampled countries, particularly in institutional and macroeconomic variables. This justifies the use of advanced panel econometric techniques, such as GMM, which can accommodate heteroskedasticity and endogeneity in dynamic environments across countries and time.

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Table 2: Descriptive Statistics Results

	Economic Growth	Financial Inclusion	Financial Literacy Index	Human Development Index	Inflation Rate	Institutional Quality	Trade Openness	Unemployment Rate
Mean	2.314720	0.297228	34.17647	0.490350	9.171898	-0.307034	54.70404	5.541958
Median	2.413617	0.294254	34.00000	0.495000	5.330467	-0.527313	53.59757	3.739000
Maximum	19.50834	0.853781	42.00000	0.741000	557.2018	7.223000	115.7653	34.00700
Minimum	-22.31305	0.015217	21.00000	0.276000	-3.233389	-2.001824	17.22512	0.316000
Std. Dev.	3.540250	0.185959	5.169675	0.080382	31.29073	1.266859	17.05754	5.505311
Skewness	-0.346278	0.666712	-0.581606	0.242458	14.54638	4.048358	0.856502	2.668151
Kurtosis	11.32452	2.933508	2.936534	3.782505	241.5727	21.09002	3.879371	10.69574
Jarque-Bera	1186.213	30.30151	23.07053	14.40678	981976.8	6677.697	63.03049	1490.909
Probability	0.000000	0.000000	0.000010	0.000744	0.000000	0.000000	0.000000	0.000000
Sum	944.4058	121.2691	13944.00	200.0630	3742.134	-125.2697	22319.25	2261.119
Sum Sq. Dev.	5101.081	14.07440	10877.29	2.629753	398497.6	653.2075	118420.7	12335.54
Observations	408	408	408	408	408	408	408	408

Authors' Computation (2025)

Correlation Analysis

The correlation matrix in Table 3 provides critical insights into the linear relationships among the key variables under investigation. As observed, economic growth shows weak and mostly negative correlations with the other variables. Specifically, it exhibits a negative relationship with financial literacy (-0.15), inflation (-0.21), and unemployment (-0.05), suggesting that higher inflation and literacy levels are marginally associated with lower economic growth. Although this seems counterintuitive in the case of financial literacy, it may reflect the cross-sectional nature of the literacy index or its interplay with other confounding institutional or structural factors across Sub-Saharan African countries. Furthermore, financial inclusion is strongly correlated with human development index (r = 0.77), and moderately with financial literacy (r = 0.28) and institutional quality (r = 0.28). This indicates that countries with stronger socio-economic development and better governance tend to have higher financial inclusion, which aligns with the broader financial development literature (Van et al., 2021). In addition, human development index also correlates highly with unemployment (r = 0.62), possibly reflecting the fact that better-developed economies report more accurate labor data or are grappling with structural employment challenges despite human capital gains. Overall, the weak correlation between financial inclusion and economic growth (-0.0024) raises further motivation for dynamic estimation approaches like GMM, where endogeneity and time-lagged effects are better addressed.

Table 3: Correlation Analysis Results

	1	2	3	4	5	6	7	8
1. Economic Growth	1.000000							
2. Financial Inclusion	-0.002383	1.000000						
3. Financial Literacy Index	-0.148137	0.282396	1.000000					
4. Human Development Index	-0.061952	0.765258	0.480148	1.000000				
5. Inflation Rate	-0.214386	0.129145	0.081741	0.086913	1.000000			
6. Institutional Quality	-0.043739	0.275968	0.063323	0.356129	-0.200168	1.000000		
7. Trade Openness	-0.002747	-0.135958	-0.024818	0.170293	0.001922	-0.134242	1.000000	
8. Unemployment Rate	-0.054723	0.436618	0.196177	0.622587	0.049213	0.390274	0.133461	1.000000

Authors' Computation (2025)

Stationary Tests

The results of the panel unit root tests presented in Table 4 strongly indicate that the economic growth variable is stationary. Across all four test statistics—Levin, Lin & Chu t*, Im, Pesaran and Shin W-stat, ADF-Fisher, and PP-Fisher—the p-values are significant at the 1% level, confirming the rejection of the null hypothesis of a unit root. This implies that the economic growth series does not suffer from non-stationarity and thus fluctuates around a constant mean over time.

Specifically, the Levin, Lin & Chu (LLC) test returns a test statistic of -7.81496 with a p-value of 0.0000, providing strong evidence against the presence of a unit root under the assumption of a common autoregressive process. Similarly, the Im, Pesaran and Shin (IPS) W-stat, which allows for individual unit root processes across cross-sections, corroborates this finding with a significant negative test statistic of -8.08464. Moreover, the ADF and PP-Fisher Chi-square tests, which aggregate individual unit root test statistics, also support the stationarity of the variable. These results are vital because they validate the appropriateness of employing dynamic panel data models such as the Generalized Method of Moments (GMM). Stationarity ensures that the data do not produce spurious regression results, thereby enhancing the reliability and robustness of the empirical estimates.

Table 4: Stationary Tests Results

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-7.81496	0.0000	48	875
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-8.08464	0.0000	48	875
ADF - Fisher Chi-square	248.490	0.0000	48	875
PP - Fisher Chi-square	511.865	0.0000	48	923

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Authors' Computation (2025)

Multicollinearity Check

The multicollinearity check presented in Table 6 offers valuable insights into the interdependence of the explanatory variables included in the study. The centered variance inflation factor (VIF) values, which are more appropriate for diagnosing multicollinearity than uncentered VIFs, reveal that none of the variables exceed the commonly accepted threshold of 10. This suggests that severe multicollinearity is not present, and that the regression estimates will not suffer from inflated standard errors due to excessive correlation among predictors.

Among the variables, the Human Development Index (HDI) has the highest centered VIF at 3.47, followed by Financial Inclusion (2.68) and Unemployment Rate (1.81). Although these values are relatively higher than others, they remain within acceptable limits, implying moderate correlations but not enough to bias the regression results significantly. Similarly, Financial Literacy Index (1.33), Trade Openness (1.21), and Institutional Quality (1.13) all demonstrate low VIFs, further confirming the absence of problematic collinearity. Importantly, this analysis affirms the statistical integrity of the econometric model. Since multicollinearity is not a major

concern, the individual effects of financial inclusion, literacy, and macroeconomic controls on economic growth can be interpreted with greater confidence.

Table 6: Multicollinearity Test Results

	Coefficient	Uncentered	Centered
Variable	**Variance**	**VIF**	**VIF**
Financial Inclusion	3.043424	13.05960	2.676139
Inflation Rate	2.85E-05	1.120788	1.028076
Trade Openness	0.000112	14.16228	1.208001
Unemployment Rate	0.001559	3.661818	1.812232
Financial Literacy Index	0.001296	59.79771	1.331584
Human Development Index	16.79949	159.4634	3.469075
Institutional Quality	0.018682	1.196454	1.128440
C	2.399981	92.68455	NA

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Regression Analysis

Relationship between Financial Inclusion and Economic Growth across SSA Countries:

The results of the Generalized Method of Moments (GMM) regression analysis provide compelling insights into the relationship between financial inclusion and economic growth across Sub-Saharan African (SSA) countries. Most notably, the negative and highly significant coefficient for financial inclusion (-4.727, $p < 0.001$) stands in stark contrast to the commonly held belief that greater access to financial services uniformly fosters growth. This suggests that in SSA, the mechanisms of financial inclusion may be poorly aligned with productive investments or long-term economic development—a view supported by Obayori (2020), who emphasizes the role of informal financial structures that often dominate in these economies.

Moreover, the significant negative effect of the lagged dependent variable, economic growth (-1), at -0.526 indicates a mean-reverting growth pattern over time. This aligns with findings by Azimi (2022), who documents similar growth inertia in developing regions. Inflation rate and unemployment also exert strong negative effects on growth, which is consistent with Saeed et al. (2024), who highlight macroeconomic volatility as a major constraint on inclusive growth in SSA. Conversely, trade openness emerges as a positive and statistically significant contributor (0.166, $p < 0.001$), underscoring the benefits of global integration, as previously discussed by Van et al. (2021). This positive outcome may reflect the increasing role of exports and external investments in driving growth among resource-dependent African economies. However, the extent to which trade fosters sustainable development still hinges on institutional frameworks and export diversification. In comparison with earlier research, these findings echo the warnings of Khan et al. (2022), who caution that without adequate financial education and infrastructure, inclusion efforts may yield minimal or even adverse outcomes. The discrepancy with more optimistic results—like those reported by Okoye et al. (2017)—highlights the regional heterogeneity and the critical role of implementation strategies. In summary, while financial inclusion is widely advocated as a growth-enhancing tool, this analysis reveals its potentially adverse short-run impact in SSA when not backed by institutional capacity, education, or sound financial regulation. Thus, improving the quality—not merely the quantity—of financial access remains a pressing priority for policymakers across the region.

Table 7: Regression Analysis Results Using GMM with Financial Inclusion as Predictor

	(1) Economic Growth	(2) Financial Inclusion	(3) Economic Growth (extended)	(4) Economic Growth (FD-GMM)
L1. depvar	0.256	0.974***	0.016	-0.526***
	(1.40)	(11.83)	(0.06)	(-21.29)
Financial Literacy	-0.043		-0.795**	
	(-0.29)		(-0.84)	
Poverty		-0.0011**	0.067**	
		(-1.37)	(0.45)	
Financial Inclusion			31.365	-4.727***
			(0.90)	(-4.17)
Inflation Rate	-0.002	0.00003	-0.0219	-0.046***
	(-0.07)	(0.34)	(-0.96)	(-11.12)
Unemployment Rate	-0.168	-0.0005**	-0.488	-2.830***
	(-0.61)	(-0.45)	(-1.10)	(-10.10)
Trade Openness	-0.018	-0.0002	0.062	0.166***
	(-0.21)	(-0.59)	(0.48)	(8.85)
Institutional Quality	4.451	0.0061	1.993	
	(0.42)	(0.23)	(0.24)	
Human Development Index	-0.098	0.0363	11.328	
	(0.00)	(0.32)	(0.49)	
_cons	7.895	0.0591	11.597	
	(0.86)	(0.88)	(0.44)	
AR(2)	0.494	0.923	—	—
Hansen J / J-statistic	0.999	1.000	—	0.283
Sargan	0.000	0.000	—	—
N	380	380	380	606

Authors' Computation (2025)

The Moderating Role of Financial Literacy:

The regression results examining the moderating role of financial literacy in the relationship between financial inclusion and economic growth in Sub-Saharan Africa (SSA) offer nuanced and insightful findings. Most notably, the interaction term between financial inclusion and financial literacy is positive (6.8049) and statistically significant at the 5% level (p = 0.0468). This suggests that financial literacy significantly conditions or enhances the impact of financial inclusion on economic growth. While financial inclusion alone displays a negative and insignificant coefficient (-246.2436), its effect becomes favorable in contexts where financial literacy is higher. This aligns with the conceptual framework that literacy empowers individuals to utilize financial tools more effectively and responsibly, thus unlocking the growth potential of inclusion (Khan et al., 2022).

Furthermore, this result corroborates Bongomin et al. (2018), who emphasized the mediating role of financial cognition and literacy in enhancing financial access outcomes. They argue that access to financial services without adequate financial knowledge often leads to underutilization or misuse, which may not translate into broader developmental outcomes. Thus, this study extends the literature by providing empirical support for financial literacy as a critical enabler within the SSA context. Additionally, the lagged dependent variable, economic growth (-1), remains negative and significant (-0.199, p = 0.0017), indicating that economic shocks or declines tend to persist over time. This persistence of growth inertia has been

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discussed by Philippon (2015), who highlights inefficiencies in financial intermediation in developing regions as a contributing factor. The significant negative relationship of inflation (-0.1199, p = 0.0178) with economic growth further highlights macroeconomic instability as a persistent threat to economic progress—an outcome mirrored in the findings of Saeed et al. (2024), who emphasized inflation's destabilizing effect in emerging economies.

On the other hand, trade openness shows a strong and significant positive effect (0.2239, p < 0.001), reinforcing earlier results and existing literature. For instance, Van et al. (2021) observed that greater trade engagement exposes economies to global markets, facilitates knowledge transfer, and enhances productivity, all of which drive growth. However, this benefit may only be fully realized when paired with institutional stability and a literate financial citizenry, enabling informed economic participation. Interestingly, unemployment has a negative but statistically insignificant coefficient (-0.3621, p = 0.3795), suggesting that while employment conditions do matter, their impact on growth may be mediated by other more dynamic variables such as literacy, inflation, and trade. This contrasts with the stronger significance of unemployment observed in previous models, indicating that in the presence of interaction effects, its direct impact may be partially absorbed or masked.

Comparatively, the findings extend the work of Sukmana and Trianto (2025), who found that Islamic financial literacy enhanced the growth effects of financial inclusion among microentrepreneurs in Indonesia. Similarly, Bustami and Saifrizal (2022) argue that when financial education is embedded in financial products, the productivity and returns on such inclusion improve significantly. In summary, the inclusion of a financial literacy interaction term reveals that inclusion without education may be insufficient or even detrimental, whereas literacy enhances the efficiency of financial access in fostering economic performance. As such, these findings challenge blanket policy endorsements of financial inclusion and instead call for targeted, literacy-integrated financial development strategies across SSA. This integrative approach is crucial for addressing the persistent disconnect between financial access and economic transformation in the region.

Table 8: Regression Analysis Results Using GMM with Financial Literacy as Moderator

	(1) Economic Growth	**(2) Financial Inclusion**	**(3) Economic Growth (extended)**	**(4) Economic Growth (FD-GMM)**	**(5) Economic Growth (Interaction)**
L1.depvar	0.256	0.974***	0.016	-0.526***	-0.199***
	(1.40)	(11.83)	(0.06)	(-21.29)	(-3.17)
Financial Literacy	-0.043		-0.795**		
	(-0.29)		(-0.84)		
Poverty		-0.0011**	0.067**		
		(-1.37)	(0.45)		
Financial Inclusion			31.365	-4.727***	-246.244**
			(0.90)	(-4.17)	(-0.77)
Interaction Term					6.805**
					(0.76)
Inflation Rate	-0.002	0.00003	-0.0219	-0.046***	-0.120**
	(-0.07)	(0.34)	(-0.96)	(-11.12)	(-2.38)

Unemployment Rate	-0.168	-0.0005**	-0.488	-2.830***	-0.362
	(-0.61)	(-0.45)	(-1.10)	(-10.10)	(-0.88)
Trade Openness	-0.018	-0.0002	0.062	0.166***	0.224***
	(-0.21)	(-0.59)	(0.48)	(8.85)	(8.49)
Institutional Quality	4.451	0.0061	1.993		
	(0.42)	(0.23)	(0.24)		
Human Development Index	-0.098	0.0363	11.328		
	(0.00)	(0.32)	(0.49)		
_cons	7.895	0.0591	11.597		
	(0.86)	(0.88)	(0.44)		
AR(2)	0.494	0.923	—	—	—
Hansen J / J-statistic	0.999	1.000	—	0.283	0.553
Sargan	0.000	0.000	—	—	—
N	380	380	380	606	387

Authors' Computation (2025)

CONCLUSION, RECOMMENDATIONS AND IMPLICATIONS

This study critically explored how financial literacy influences the effectiveness of financial inclusion in promoting economic growth across Sub-Saharan African (SSA) countries from 2003 to 2023. Drawing on dynamic panel estimation using the Generalized Method of Moments (GMM), the analysis provided robust empirical insights into the interrelationships between financial inclusion, financial literacy, and growth. Notably, the study found that financial inclusion on its own does not significantly foster economic growth and may even have adverse effects in low-literacy environments. However, when financial literacy is introduced as a moderating variable, the relationship between inclusion and growth shifts positively, highlighting the importance of financial capability in translating access into developmental outcomes.

Moreover, consistent with economic theory and prior empirical research, macroeconomic stability indicators such as inflation and unemployment exerted significant influence on economic growth. Meanwhile, trade openness positively contributed to growth, reaffirming the importance of global economic integration. These findings collectively underscore the complexity of financial development in SSA, where access to financial tools must be complemented by institutional quality, economic resilience, and human capacity.

In light of the findings, several critical recommendations are proposed that; first, governments and financial regulatory bodies in SSA should integrate national financial literacy strategies into broader economic inclusion programs. Initiatives such as curriculum integration, adult financial education, and digital awareness campaigns can equip individuals with the knowledge to make informed financial decisions. Second, financial institutions and fintech startups must collaborate with policymakers to design inclusive products that are not only accessible but also accompanied by financial education. For instance, microcredit schemes or mobile banking services should include simple, multilingual guides and community workshops.

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Third, regional organizations like the African Union and ECOWAS should champion cross-country platforms for sharing financial literacy tools, best practices, and harmonized policies that promote inclusive finance with strong regulatory oversight. Fourth, development partners and NGOs should prioritize interventions that address both financial inclusion and literacy in tandem. Focusing on one without the other may limit the transformative power of financial access on poverty alleviation and economic empowerment.

The study's results reveal the need for holistic financial sector reforms that go beyond infrastructure to include human capital development. Financial literacy must be treated not as a complementary component but as a strategic pillar of financial sector growth. This insight has implications for budget allocations, development planning, and regional policy frameworks. For scholars, the findings encourage a deeper investigation into the interaction effects of soft variables like literacy, trust, and digital familiarity on the traditionally hard metrics of finance and growth. The model also demonstrates the utility of GMM in dealing with endogeneity and dynamic relationships within macroeconomic variables, thereby offering a strong methodological precedent.

Practitioners in finance, education, and development should recognize that expanding financial access without preparing users for responsible engagement risks deepening vulnerability rather than reducing it. Financial inclusion policies must therefore be reimagined to account for user readiness, informed by ongoing monitoring and impact evaluations. In summary, the study illuminates the transformative potential of financial literacy in maximizing the benefits of financial inclusion for economic growth in SSA. It urges stakeholders to move from access-focused metrics to capability-enhancing strategies, thereby fostering sustainable, inclusive development across the continent.

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