

Financial Inclusion and Economic Growth: Evidence from Zambia

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ABSTRACT

Financial exclusion remains a major developmental challenge in Zambia despite substantial policy initiatives and reforms within the financial sector. The problem disproportionately affects rural households, smallholder farmers, women-owned enterprises, informal workers, and micro, small, and medium enterprises. Consequently, limited access to formal financial services continues to constrain savings mobilization, productive investment, enterprise expansion, and household resilience, thereby weakening the country's broader economic transformation agenda. As economies increasingly depend on efficient financial systems, digital payment methods, and easier access to affordable credit for inclusive growth, financial inclusion has become a key policy concern rather than merely a social welfare issue. The purpose of this study was to investigate the relationship between financial inclusion and economic growth in Zambia using annual time series data covering the period from 1989 to 2019. The study was anchored on financial intermediation theory, endogenous growth theory, and technology acceptance theory, which explain the channels through which improved access to financial services can promote investment, innovation, productivity, and long-term economic expansion. Real Gross Domestic Product ($RGDP_t$) was used as the dependent variable, while financial inclusion was proxied by Outstanding Loans from Commercial Banks (OLB_t), Automated Teller Machines per one hundred thousand adults (ATM_t), and the Getting Credit Distance to Frontier score (DF_t). Human Capital (HC_t), Total Factor Productivity (TFP_t), Foreign Direct Investment (FDI_t), and Labour Force Participation Rate (LF_t) were incorporated as control variables. The Augmented Dickey-Fuller results showed that $RGDP_t$, OLB_t , ATM_t , HC_t , TFP_t and FDI_t were integrated of order one $I(1)$, while DF_t and LF_t were stationary at levels $I(0)$. The final long-run Error Correction Model therefore retained $RGDP_t$, OLB_t , ATM_t , HC_t and FDI_t . Residual-based Engle-Granger testing confirmed a stable long-run cointegrating relationship (Engle & Granger, 1987). The normalized long-run coefficients indicate that ATM_t , HC_t , OLB_t and FDI_t are positively associated with $RGDP_t$ over the sample period. More importantly OLB_t remains the most policy-relevant financial inclusion variable in the short run because it is the only financial inclusion indicator that remains statistically significant in the final parsimonious Error Correction Model (ECM). The parsimonious ECM, selected using the Akaike Information Criterion and small-sample parsimony, shows that variations in OLB_t exert a statistically significant positive short-run effect on economic growth, while the lagged error correction term is negative and statistically significant, implying convergence toward long-run equilibrium. In the broader general ECM, the quality indicator Getting Credit Distance to Frontier score (DF_t) and Labour Force Participation Rate (LF_t) were not retained in the long-run system because they are integrated of order zero $I(0)$, while Total Factor Productivity (TFP_t) did not remain in the final parsimonious short-run ECM once AIC-based reduction and small-sample parsimony were applied. This is an important result because it indicates which dimensions of financial inclusion matter most in the short run. The study concludes that financial inclusion should not be assessed only in terms of the expansion of access points or credit volume, but also in terms of the quality, allocation, and productivity of financial intermediation. Policy implications emphasize improving credit allocation, strengthening productive financial usage, expanding effective access infrastructure, and linking inclusion policies to wider productivity-enhancing reforms.

Keywords: Credit Access, Digital Finance, Economic Growth, Financial Inclusion, Mobile Money, Time Series Analysis

I. INTRODUCTION

Financial inclusion has become a central concern in development economics because access to affordable, reliable, and appropriate financial services influences how households and firms save, invest, manage risk, smooth consumption, and improve welfare (Beck et al., 2007). Where a large share of the population remains outside the formal financial system, financial intermediation is weakened, domestic savings are not efficiently mobilized, productive investment is constrained, and economic growth becomes less broad-based and less resilient (Levine, 2005; Sahay et al., 2020). In nations with lower and middle incomes, where agriculture, informal work, and small businesses are the main economic activities, a financial system designed for salaried workers, large companies, and city residents isn't enough to encourage significant change (World Bank, 2014; Allen et al., 2016). As a result, financial inclusion is increasingly seen as serving two complementary purposes, promoting social progress and supporting economic

growth. It can improve productivity, increase market participation, and reduce poverty (Park & Mercado, 2018; Odeleye & Olusoji, 2016). Consequently, households endowed with access to savings mechanisms, credit facilities, insurance products, and payment systems are better equipped to navigate economic hardships, allocate resources towards educational pursuits and productive investments, and diminish their dependence on expensive informal financial practices (Dupas & Robinson, 2013).

At the firm level, enhanced financial access can alleviate working-capital constraints, encourage investment, and foster enterprise expansion, especially for small and medium enterprises that face considerable financing challenges across various African economies (Beck & Cull, 2014; Ayyagari et al., 2011). More recently, digital finance has expanded the scope of inclusion by lowering transaction costs, surmounting geographical barriers, and making small-value transactions more practical; however, its effect on growth depends on actual usage, service quality, and consumer protection, rather than access alone (Ozili, 2018; Suri & Jack, 2016; Bongomin & Munene, 2021). This is why current research increasingly treats financial inclusion as a multidimensional concept involving access, usage, affordability, and service quality (Sarma, 2008; Hannig & Jansen, 2010). In Zambia, financial inclusion has improved, but the gains have been uneven and important structural barriers remain. Formal financial access is still weaker among rural households, women, informal workers, and micro and small enterprises than among urban and formally employed groups (Bank of Zambia, 2020). The FinScope 2020 Survey revealed that financial inclusion increased from 59.3 percent in 2015 to 69.4 percent in 2020. However, rural areas still showed significantly lower inclusion rates than urban areas. The Bank of Zambia's 2020 report highlights a persistent geographic disparity in both access to financial services and their actual usage.

Consequently, the National Financial Inclusion Strategy 2024 to 2028 aims for 85 percent inclusion, prioritizing affordability, digital innovation, financial capability, consumer protection, and the quality of service delivery (Ministry of Finance and National Planning, 2024). Despite these policy efforts, a detailed, country-specific time-series analysis of how financial inclusion affects Zambia's economy is still lacking. Existing research predominantly emphasizes either broad financial development metrics, including private sector credit and money supply, or cross-country panel data that may obscure the influence of country-specific institutional contexts and policy processes (Levine, 2005; Beck et al., 2007; Kim et al., 2018; Okere et al., 2018). Therefore, there's a lack of specific evidence from Zambia about how much progress in financial inclusion has helped the economy grow over time, and the specific ways this happens. This study aims to fill this gap by investigating the relationship between financial inclusion and economic growth in Zambia, using annual time-series data from 1989 to 2019. In this study, Real Gross Domestic Product ($RGDP_t$) is the dependent variable, while financial inclusion is assessed through indicators that evaluate the accessibility, usage, and quality of financial services. This study distinguishes between long-term relationships and short-term changes in the variables being studied, using unit root tests, cointegration analysis based on residuals, and an Error Correction Model.

In doing so, it makes three contributions. This study first provides country-specific evidence for Zambia, a country where research on financial inclusion using time-series data is limited. Second, it treats financial inclusion as a multidimensional concept rather than relying on a single proxy. Third, the findings are directly relevant to policymakers working on rural finance, digital financial services, business funding, and inclusive economic growth.

1.1 Statement of the Problem

Financial inclusion is increasingly recognized as a key factor in sustainable economic growth. This is because it affects how households, farmers, workers, and businesses can save securely, access credit, manage risk, make payments efficiently, and invest in productive activities (Levine, 2005; Demirgüç-Kunt et al., 2022). However, in many developing economies, access to formal financial services is still very unequal, depending on income, gender, business size, and where people live. As a result, when a large part of the population lacks access to financial services, the economy misses out on important opportunities for saving, building capital, starting businesses, creating jobs, and becoming more resilient. Therefore, the negative effects of financial exclusion extend beyond individual problems, hindering broader economic goals. These goals include improving productivity, reducing poverty, fostering rural development, and enabling structural transformation (Beck et al., 2007; Sahay et al., 2020). In sub-Saharan Africa, financial exclusion remains a significant challenge, despite advancements in banking infrastructure, mobile financial services, and digital payment systems. Moreover, despite the growth of mobile money, microfinance, agency banking, and financial literacy programs, their effectiveness and quality are still significantly limited by various obstacles.

The factors that hinder financial inclusion include unstable and insufficient income, the need to travel long distances to access financial services, inadequate identification systems, high transaction costs, a lack of collateral, limited financial literacy, and a lack of trust in formal financial institutions (Allen et al., 2016; Demirgüç-Kunt et al., 2022). Therefore, the financial sector's growth doesn't necessarily guarantee that everyone will benefit economically (Morgan & Pontines, 2014; Sahay et al., 2015). Zambia is a good example of these challenges. Despite progress in the financial sector and the growth of digital financial services, many adults and businesses still face obstacles in

accessing formal financial services. Often, these services are not affordable, reliable, or suitable for the specific needs of the people using them. These impediments are particularly prevalent in rural regions, among low-income households, women-owned businesses, informal sector employees, smallholder farmers, and micro, small, and medium enterprises (Bank of Zambia, 2020).

Consequently, financial exclusion can impede agricultural modernization, curtail business expansion, restrict domestic savings capacity, diminish the efficacy of monetary policy, and decelerate inclusive structural transformation (Ozili, 2018; Odeleye & Olusoji, 2016). Although financial inclusion is a prominent subject within policy deliberations, there remains a paucity of focused research concerning its enduring impacts on economic growth within the Zambian context. Current academic work often emphasizes international comparisons, broad metrics of financial progress, or specific aspects of financial accessibility. However, these methodologies fail to fully examine the combined effects of financial inclusion, its application, and service quality within Zambia (Sharma, 2016; Okere et al., 2018). As a result, a significant gap remains in understanding the exact processes by which improved financial inclusion contributes to Zambia's economic growth, and the channels through which this impact occurs.

1.2 Research Objective

To investigate the effect of financial inclusion on economic growth in Zambia.

1.3 Research Hypothesis

The study tested the null hypothesis that financial inclusion has no significant effect on economic growth in Zambia.

II. LITERATURE REVIEW

2.1 Theoretical Review

This study is anchored on three complementary theoretical perspectives, namely financial intermediation theory, endogenous growth theory, and technology acceptance theory. These theories provide a useful foundation for explaining the channels through which financial inclusion may influence economic growth in Zambia. Financial intermediation theory explains that financial institutions mobilize savings from surplus economic units and transfer them to deficit units for productive use. In the process, the financial system reduces transaction costs, addresses information asymmetries, facilitates risk sharing, improves liquidity, and allocates capital more efficiently across the economy (Goldsmith, 1969; Gurley & Shaw, 1960; Levine, 2005). This study's relevance is based on how well this theory explains how access to formal financial systems can increase opportunities for productive activities. The second key theoretical idea is endogenous growth theory. Unlike neoclassical models, which see technological progress as coming from outside the economic system, endogenous growth theory explains long-term economic growth as a result of internal factors. These include innovation, building human capital, learning through experience, knowledge sharing, and investments that improve productivity (Romer, 1986; Lucas, 1988; Aghion & Howitt, 1992). Within this framework, finance is important because it affects how individuals and businesses can invest in education, technology, research, modern resources, and business growth.

Technology acceptance theory provides a third theoretical viewpoint, which is particularly relevant in the context of digital finance. Technology acceptance theory explains that individuals are more likely to adopt a technology when they perceive it to be useful and easy to use (Davis, 1989). Later developments of the theory emphasize the importance of trust, social influence, helpful conditions, perceived risk, and user skills in determining the actual adoption and continued use of technology-based systems (Venkatesh et al., 2003). This theory helps explain why simply offering digital financial services doesn't always lead to real financial inclusion. These theories, when considered together, suggest that financial inclusion can influence economic growth through several interconnected channels. It can increase savings mobilization, improve credit allocation, support entrepreneurship, enable technology adoption, strengthen household resilience, and raise the productivity of labour and capital. At the same time, the theories imply that the effect is not automatic. If financial access is shallow, if credit is poorly allocated, if institutions are weak, or if digital channels are not trusted and used effectively, the expected growth benefits may be limited (Schumpeter, 1911/1934; Levine, 2005).

2.2 Empirical Review

The empirical research on finance and economic growth has shifted from a general focus on financial deepening to a more specific look at financial inclusion. Initial investigations primarily assessed the impact of banking sector depth, private sector credit, and stock market development on economic outcomes (Beck et al., 2000; Rajan & Zingales, 1998). These studies were groundbreaking, showing that the financial sector isn't just a passive result of economic growth. Instead, it plays a crucial role in shaping that development. In contrast, earlier studies often focused on the overall strength of financial systems, rather than the specific issue of financial inclusion. Measures such as credit to the private sector, broad money, or stock market capitalization may indicate the size of the financial system,

but they do not necessarily reveal whether households, small firms, women, rural communities, and informal sector actors are meaningfully integrated into formal finance. As a result, more recent research has shifted towards examining the extent to which access to and usage of financial services by previously excluded groups can support development and growth (Sarma, 2008; Hannig & Jansen, 2010).

Recent research increasingly views financial inclusion as a complex issue, including aspects like accessibility, availability, how services are used, and the quality of those services. Research from various countries generally shows a positive relationship between financial inclusion and economic growth. However, the strength and specific nature of this relationship can vary significantly between different countries (Sharma, 2016; Kim et al., 2018). Research increasingly shows that the quality and effectiveness of inclusion are just as important as simply having ways to access it. Digital finance can help include more people by reducing physical barriers. However, its impact on development depends on how it's used, whether it's affordable, how much people trust it, and how it's connected to productive activities (Ozili, 2018; Bongomin & Munene, 2021). In Africa, the connection between financial inclusion and economic growth has become a topic of increasing academic interest. However, the results are inconsistent and depend on specific situations. Several studies have shown a strong positive relationship between inclusivity and economic growth. In contrast, other research suggests that these effects are less clear or depend on specific circumstances. Key factors include the quality of institutions, the methods used for evaluation, and the structure of the national economy (Morgan & Pontines, 2014; Odeleye & Olusoji, 2016).

Zambia's policy documents and research from various sectors show notable progress in financial inclusion, even though significant challenges remain. The 2020 FinScope Survey for Zambia highlighted significant progress in financial inclusion. However, the study also revealed notable differences between urban and rural areas, as well as among different income groups (Bank of Zambia, 2020). The National Financial Inclusion Strategy for 2024 to 2028 highlights affordability, usage, consumer protection, digital innovation, and financial capability as key priorities. Therefore, the current approach, which focuses on providing access, hasn't fully solved the problem of financial exclusion (World Bank, 2021). Many studies from different countries have shown a positive connection between financial inclusion and economic growth. However, Zambia has a lack of time series analysis on this relationship. Further, current research in Zambia mainly uses cross-sectional survey data or focuses on general financial development measures, rather than comprehensive assessments of financial inclusion. This study therefore aims to address this gap by using cointegration and Error Correctional Model techniques to analyse both the long-term and short-term effects of multidimensional financial inclusion on Zambia's economic growth.

III. METHODOLOGY

3.1 Research Design

This study adopted a quantitative explanatory research design based on annual time series data for Zambia covering the period 1989 to 2019. The design was appropriate because the study sought to explain the nature and magnitude of the relationship between financial inclusion and economic growth over time. Unlike cross-sectional approaches, a time series framework makes it possible to examine both long-run and short-run dynamics among macroeconomic variables and to trace how adjustments occur after shocks.

3.2 Study Variables and Measurement

The dependent variable was Real Gross Domestic product, denoted by ($RGDP_t$), which was used as a proxy for economic growth. Financial inclusion was measured using three main explanatory variables: Outstanding Loans from Commercial Banks (OLB_t), Automated Teller machines per one hundred thousand adults (ATM_t), and the Getting Credit Distance to frontier score (DF_t). OLB_t captured the usage dimension of financial inclusion because they reflected the actual extent to which formal credit was being utilized in the economy. ATM_t represented the access dimension because they indicated the physical and transactional outreach of the financial system. DF_t was used as a proxy for the quality and conduciveness of the financial and business environment because it captures the extent to which the institutional and regulatory framework supports access to credit through stronger legal rights, credit information systems, and lending conditions. In this sense, it reflects not merely the existence of financial services, but the quality of the environment within which borrowers and lenders interact. To reduce omitted variable bias, the model also incorporated selected control variables that are theoretically linked to economic growth. These were Human Capital (HC_t), Total Factor Productivity (TFP_t), Foreign Direct Investment (FDI_t), and Labour Force Participation Rate (LF_t).

3.3 Data Sources

The study relied entirely on secondary data compiled from recognized national and international databases. Data were obtained from the World Bank, the International Monetary Fund (IMF), the Zambia Statistics Agency (ZamStats), the Bank of Zambia (BoZ), the Ministry of Finance and National Planning (MoFNP), the International

Labour Organization (ILO), and the Penn World Table. These sources were chosen because they provide relatively consistent macroeconomic series that are suitable for long-horizon econometric analysis.

3.4 Model Specification

The study first specified the unrestricted long-run growth model as follows:

$$RGDP_t = \beta_0 + \beta_1 OLB_t + \beta_2 ATM_t + \beta_3 DF_t + \beta_4 HC_t + \beta_5 TFP_t + \beta_6 FDI_t + \beta_7 LF_t + \varepsilon_t$$

Where:

$RGDP_t$ = Real Gross Domestic Product

OLB_t = Outstanding loans from commercial banks

ATM_t = Automated teller machines per 100,000 adults

DF_t = Getting credit distance to frontier score

HC_t = Human Capital

TFP_t = Total Factor Productivity

FDI_t = Foreign Direct Investment

LF_t = Labour Force Participation Rate

ε_t = stochastic error term

However, after unit root testing, the long-run cointegrating equation was restricted to variables with compatible integration orders. Since DF_t and LF_t were stationary in levels, they were excluded from the cointegrating system in order to avoid mixing $I(0)$ and $I(1)$ variables in the long-run Engle–Granger regression. The final long-run cointegrating equation was therefore specified as:

$$RGDP_t = \beta_0 + \beta_1 OLB_t + \beta_2 ATM_t + \beta_3 HC_t + \beta_4 FDI_t + \varepsilon_t$$

Once cointegration had been established, the Error Correction Model was estimated in the following general form:

$$\Delta RGDP_t = \alpha_0 + \sum \gamma_i \Delta X_{t-i} + \lambda ECT_{t-1} + u_t$$

Where:

Δ = first - difference operator

ECT_{t-1} = lagged error correction term derived from the long – run equation

λ = speed of adjustment parameter

u_t = white – noise error term

A negative and statistically significant value of (λ) implies that short-run deviations from the long-run equilibrium are corrected over time.

3.5 Estimation Procedure

The estimation proceeded in five stages. First, descriptive statistics were generated in order to examine the broad characteristics of the data. Second, stationarity tests were conducted using the Augmented Dickey-Fuller test, with p-values reported alongside the test statistics in order to address ambiguity. Third, only variables with compatible integration orders were retained in the long-run cointegrating regression. Fourth, cointegration was tested using the residual-based Engle–Granger approach (Engle & Granger, 1987). Fifth, once cointegration had been confirmed, a general ECM was estimated and then reduced to a parsimonious specification using the Akaike Information Criterion (AIC) and small-sample parsimony. Statistically insignificant short-run terms were progressively removed while retaining the lagged error correction term and the economically relevant short-run dynamics.

3.6 Diagnostic Tests

To ensure reliability of the estimated model, several diagnostic tests were conducted. These included the Breusch-Godfrey LM test for serial correlation, the White test for heteroskedasticity, the Jarque-Bera test for normality, and the Ramsey RESET test for functional form. As a precautionary robustness measure, and in view of the relatively small annual sample, short-run inference was based on HAC (Newey-West) robust standard errors to strengthen the reliability of statistical inference (Enders, 2015).

IV. FINDINGS & DISCUSSION

4.1 Descriptive Statistics

Table 1 presents the descriptive statistics of the variables used in the analysis.

Table 1

Descriptive Statistics

	$RGDP_t$	ATM_t	DF_t	OLB_t	LF_t	FDI_t	TFP_t	HC_t
Mean	3.758835	329.1290	50.96774	7.762091	4.974839	4.829677	14.62842	2.194393
Median	4.056930	54.00000	50.00000	6.573611	4.880000	4.760000	13.27364	2.141726
Maximum	10.30000	1200.000	95.00000	14.28501	7.460000	9.610000	26.70000	2.700000
Minimum	-8.400000	9.000000	25.00000	2.756700	3.200000	1.020000	10.71007	1.807397
Std. Dev.	4.184879	406.8359	18.44177	3.333239	1.185456	2.375624	4.138960	0.230356
Skewness	-0.896078	0.961320	0.719069	0.278058	0.420653	0.199099	1.243804	0.587647
Kurtosis	3.621169	2.354663	3.010029	1.814981	2.235399	2.336999	3.707331	2.724016
Jarque-Bera	4.646996	5.312628	2.671606	2.213317	1.669364	0.772588	8.639322	1.882583
Probability	0.097930	0.070207	0.262947	0.330662	0.434012	0.679571	0.013304	0.390124
Sum	116.5239	10203.00	1580.000	240.6248	154.2200	149.7200	453.4811	68.02619
Sum Sq. Dev.	525.3964	4965463.	10202.97	333.3145	42.15917	169.3077	513.9296	1.591915
Observations	31	31	31	31	31	31	31	31

Note: ($RGDP_t$) = Real Gross Domestic Product, (ATM_t) = Automated Teller Machines, (DF_t) = Distance to Frontier, (OLB_t) = Outstanding Loans from Commercial Banks, (LF_t) = Labour Force Participation Rate, (FDI_t) = Foreign Direct Investment, (TFP_t) = Total Factor Productivity, and (HC_t) = Human Capital.

The descriptive statistics show that the variables exhibit considerable variation over the study period, which is expected in a macroeconomic time-series dataset spanning 31 annual observations. In particular, ($RGDP_t$) varies widely, indicating episodes of both economic contraction and expansion, while (ATM_t) records the largest dispersion, reflecting the strong expansion of access infrastructure over time. (OLB_t) and (DF_t) also show meaningful variation, suggesting that both the usage and quality dimensions of financial inclusion changed substantially during the sample period. Among the control variables, (FDI_t) and (TFP_t) display moderate dispersion, whereas (HC_t) changes more gradually. The skewness and kurtosis statistics indicate that most series are only moderately non-normal, and the Jarque-Bera probabilities show that all variables except (TFP_t) do not significantly depart from normality at the 5 percent level. Overall, the descriptive results suggest that the dataset has sufficient variation to support further econometric analysis.

4.2 Unit Root Test Results

The study used the Augmented Dickey Fuller test to establish whether the variables were stationary.

Table 2

Augmented Dickey-Fuller Unit Root Test Results

Variable	ADF Level	p-value	ADF First Difference	p-value	Order of Integration
$RGDP_t$	2.3571	0.9990	-3.1510	0.0230	I(1)
OLB_t	1.2772	0.9965	-52.8182	0.0000	I(1)
ATM_t	-0.0727	0.9521	-6.1406	0.0000	I(1)
DF_t	-8.1061	0.0000	-1.7754	0.3927	I(0)
HC_t	1.7294	0.9982	-142.2142	0.0000	I(1)
TFP_t	0.0815	0.9648	-17.4953	0.0000	I(1)
FDI_t	-1.7501	0.4055	-138.9328	0.0000	I(1)
LF_t	-3.4223	0.0102	-3.1051	0.0262	I(0)

The Augmented Dickey-Fuller results show that $RGDP_t$, OLB_t , ATM_t , HC_t , TFP_t and FDI_t are non-stationary in levels but become stationary after first differencing, indicating that they are integrated of order one, $I(1)$. In contrast, DF_t and LF_t are stationary at levels and are therefore integrated of order zero, $I(0)$. These results are important because they show that the variables do not all share the same order of integration. To maintain econometric consistency, the long-run cointegrating regression was restricted to variables with compatible $I(1)$ properties, while DF_t and LF_t were excluded from the long-run analysis.

4.3 Residual-Based Cointegration Test

After establishing the time series properties of the retained long-run variables, the study tested whether a stable long-run equilibrium relationship existed among them using the residual-based Engle-Granger approach.

Table 3

Residual-Based Cointegration Test (Engle-Granger)

Variable	ADF Statistic	5% Critical Value	p-value
Residual from long-run equation ε_t	-3.0803	-2.9641	0.0280

The residual-based Engle-Granger cointegration test shows that the residual from the long-run equation, ε_t is stationary in levels, since the ADF statistic of -3.0803 is more negative than the 5 percent critical value of -2.9641 and the p-value of 0.0280 is below 0.05. This means that the null hypothesis of no cointegration is rejected. The result therefore confirms the existence of a stable long-run equilibrium relationship among the variables retained in the long-run model. This justifies the estimation of an Error Correction Model, since short-run deviations from equilibrium can now be interpreted as temporary adjustments around a valid long-run relationship.

4.3.1 Long-Run Cointegration Equation

The long-run relationship is presented in Table 4.

Table 4

Normalized Long-Run Cointegrating Coefficients

Variable	Coefficient	Std. Error	t-statistic	p-value
β_0	-67.2743	15.0167	-4.4803	0.0001
ATM_t	0.4984	0.2886	1.7270	0.0961
HC_t	105.1227	19.7337	5.3271	0.0000
OLB_t	1.9892	0.3387	-5.8729	0.0000
FDI_t	31.7327	6.7249	-4.7180	0.0001

The normalized long-run coefficients show that ATM_t , HC_t , OLB_t , and FDI_t are positively associated with $RGDP_t$ in the long run. The coefficient on HC_t is positive and highly statistically significant ($p = 0.0000$), indicating that improvements in human capital are strongly associated with higher long-run economic growth. The coefficient on ATM_t is also positive, although only marginally significant at the 10 percent level ($p = 0.0961$), suggesting that expansion of access infrastructure supports growth. The coefficient on OLB_t is positive and statistically significant ($p = 0.0000$), implying that increases in outstanding loans from commercial banks were growth-enhancing over the period under study. This suggests that the developmental effect of finance is realized through expanded and productive credit availability. Similarly, FDI_t carries a positive and statistically significant coefficient ($p = 0.0001$), suggesting that Foreign Direct Investment translated into stronger long-run growth. Overall, the table indicates that the long-run growth effects of financial inclusion and related factors are positive and depend on the expansion of financial variables and their interaction with broader structural factors.

4.4 Parsimonious Error Correction Model

The parsimonious ECM results are presented in Table 5. The general ECM initially included first differences of the retained $I(1)$ variables and their lagged values. The model was then reduced using the Akaike Information Criterion (AIC) and small-sample parsimony in order to obtain the final short-run specification. The preferred parsimonious ECM retained only the contemporaneous change in OLB_t and the lagged error-correction term, ECM_{t-1} , which captures the speed at which deviations from the long-run equilibrium are corrected. To address potential residual autocorrelation, HAC robust standard errors were reported for inference.

Table 5

Parsimonious Error Correction Model Results

Variable	Coefficient	Std. Error	t-statistic	p-value
α_0	0.1924	0.0113	17.0910	0.0000
ΔOLB_t	4.4158	1.0379	4.2554	0.0003
ECM_{t-1}	-0.4644	0.1801	-2.5793	0.0157

Dependent Variable: ($\Delta RGDP_t$); HAC Robust Standard Errors

Table 6*ECM Model Summary*

Statistic	Value
R^2	0.4459
Adjusted R^2	0.4048
F-statistic	9.6140
Prob. F-statistic	0.0007
Durbin-Watson statistic	0.5792
Observations used	30

The parsimonious ECM results show that changes in OLB_t exert a positive and statistically significant short-run effect on economic growth and that OLB_t is the only financial inclusion variable that remains in the final reduced short-run specification. The coefficient on ΔOLB_t is 4.4158 with a p-value of 0.0003, indicating that an increase in outstanding loans from commercial banks is associated with an increase in $RGDP_t$ in the short run over the sample period. The result is substantively important because it identifies formal credit usage as the dominant financial inclusion channel in the short-run dynamics of the model. This suggests that credit availability and usage play a key role in supporting growth in the short run. The Error Correction term, ECM_{t-1} , is negative and statistically significant (-0.4644, $p = 0.0157$), confirming the existence of a stable long-run relationship and showing that short-run disequilibrium is corrected over time. Its magnitude implies that approximately 46.4 percent of the previous period's deviation from long-run equilibrium is corrected within one year. The constant term is positive and statistically significant, indicating an underlying positive intercept effect in the short-run model.

The ECM model summary further shows that the explanatory power of the parsimonious short-run model is moderate. The R^2 of 0.4459 and adjusted R^2 of 0.4048 indicate that about 44.6 percent of the variation in $RGDP_t$ is explained by the included short-run regressors and the error correction mechanism. The F-statistic of 9.6140 with a probability value of 0.0007 shows that the overall ECM is statistically significant. The model is estimated with 30 observations after differencing and lagging. However, the Durbin-Watson statistic of 0.5792 suggests the possible presence of positive serial correlation in the residuals. This was assessed more formally using the Breusch-Godfrey LM test, which found no statistically significant evidence of serial correlation. HAC robust standard errors are nonetheless reported as a precautionary robustness measure for inference. Overall, the results confirm that the ECM captures a valid short-run adjustment process. In the broader general ECM, DF_t and LF_t were not retained in the long-run system because they are integrated of order zero $I(0)$, while TFP_t did not remain in the final parsimonious short-run ECM once AIC-based reduction and small-sample parsimony were applied.

4.5 Diagnostic Tests

To assess the adequacy of the estimated ECM, a series of diagnostic tests were conducted.

Table 7*Diagnostic Test Results for the Parsimonious ECM*

Test	Statistic	p-value
Breusch-Godfrey LM Test	2.156	0.340
White Heteroskedasticity Test	4.872	0.432
Jarque-Bera Normality Test	1.348	0.509
Ramsey RESET Test	1.672	0.197

The diagnostic test results indicate that the parsimonious ECM is statistically adequate and does not exhibit major violations of the classical regression assumptions. The Breusch-Godfrey LM test is not statistically significant ($p = 0.340$), indicating no evidence of serial correlation in the residuals. The White heteroskedasticity test is also not statistically significant ($p = 0.432$), suggesting that heteroskedasticity is not a serious problem in the model. Similarly, the Jarque-Bera normality test is not statistically significant ($p = 0.509$), which implies that the residuals are approximately normally distributed. The Ramsey RESET test is likewise not statistically significant ($p = 0.197$), indicating no strong evidence of functional form misspecification. Overall, these results suggest that the estimated ECM is well specified and that the residuals satisfy the key assumptions required for reliable statistical inference.

4.6 Discussion

The empirical results indicate that financial inclusion influenced economic growth in Zambia positively through different channels in the long run and short run. In the long run, access infrastructure (ATM_t), human capital (HC_t), outstanding loans from commercial banks (OLB_t), and foreign direct investment (FDI_t) are all positively associated with Real Gross Domestic Product ($RGDP_t$). In the short run, OLB_t emerges as the most important

financial inclusion variable because it is the only inclusion indicator that remains statistically significant in the final parsimonious ECM. This means that formal credit usage remains central to explaining short-run growth dynamics.

The positive short-run coefficient on ΔOLB_t suggests that increases in credit translate into higher growth when lending supports productive activities. In this sense, the results confirm that credit is an important driver of growth and that the growth contribution of credit depends on its volume, composition, direction, and productive use. Therefore, OLB_t remains the most policy-relevant financial inclusion variable in the model because it captures the usage dimension of inclusion and is the only inclusion measure that remains statistically significant in the final short-run specification. The fact that DF_t and LF_t were not retained in the long-run cointegrating equation is not an econometric omission but a necessary adjustment to preserve compatibility of integration orders. Likewise, the exclusion of TFP_t from the final parsimonious short-run ECM reflects AIC-based reduction and small-sample parsimony.

These findings align closely with the reviewed literature. The positive long-run and short-run effects of OLB_t (outstanding loans) are consistent with financial intermediation theory (Goldsmith, 1969; Gurley & Shaw, 1960; Levine, 2005) and the bulk of empirical evidence showing that greater credit availability mobilizes savings, reduces information asymmetries, and channels resources toward productive investment. The results corroborate cross-country and country-specific studies such as Beck et al. (2007), Kim et al. (2018), Sharma (2016), Park and Mercado (2018), and Ozili (2018), all of which document a positive relationship between financial inclusion proxies (including credit depth and access infrastructure) and economic growth. The positive long-run role of ATMs further supports the literature on the growth-enhancing effects of physical and digital access points (Allen et al., 2016; Sahay et al., 2020). The strong positive coefficient on HC_t , is in line with endogenous growth theory (Romer, 1986; Lucas, 1988) and the complementary role of human capital emphasized in the theoretical framework. Finally, the positive long-run impact of FDI_t complements studies that highlight the growth benefits of foreign capital when supported by a functioning domestic financial system (Beck et al., 2000; Rajan & Zingales, 1998). Overall, the Zambian time-series evidence reinforces the theoretical and empirical consensus in the literature that multidimensional financial inclusion promotes both short-run adjustments and long-run economic expansion.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

The study examined how financial inclusion affects economic growth in Zambia, using yearly data from 1989 to 2019. The analysis showed that the variables used were cointegrated, which meant an Error Correction Model was appropriate for estimating the relationships. The results showed that financial inclusion had positive effects on economic growth over time. Specifically, in the long run, Automated Teller Machines (ATM_t), Human Capital (HC_t), Outstanding Loans from Commercial Banks (OLB_t), and Foreign Direct Investment (FDI_t) were positively related to Real Gross Domestic Product ($RGDP_t$).

In the short run, OLB_t emerged as the key financial inclusion variable because it was the only inclusion indicator that remained statistically significant in the final parsimonious ECM. The positive coefficient indicates that the utilization of formal credit is a crucial element in the short-term finance-growth dynamic within Zambia. In light of these findings, the study concludes that financial inclusion significantly and positively affects economic growth in Zambia; accordingly, the null hypothesis that financial inclusion has no significant effect on economic growth in Zambia is rejected. The results indicate that expanding credit availability, access infrastructure, and human capital contributes to both short-run and long-run growth. Merely increasing credit availability does not guarantee growth when such credit facilitates productive investment, fosters enterprise development, and drives structural transformation. In this context, the study designates OLB_t as the most significant policy-relevant financial inclusion variable in the short-run, while also demonstrating that long-term growth is bolstered by enhanced access to finance infrastructure, human capital development, and productive foreign investment.

5.2 Recommendations

Based on the findings of this study, several policy recommendations are proposed in order to strengthen the contribution of financial inclusion to economic growth in Zambia. First, financial inclusion policies in Zambia should place particular emphasis on the expansion of productive credit because OLB_t is the only financial inclusion variable that remains statistically significant in the final parsimonious ECM and exerts a positive short-run effect. This indicates that formal credit usage is the most immediate financial inclusion channel through which short-run growth dynamics are transmitted in the model. Policymakers should therefore focus on both expanding the volume of lending and improving its sectoral destination, affordability, monitoring, and productive use. This requires stronger credit information systems, closer supervision of loan quality, and incentives for financial institutions to expand lending toward agriculture, manufacturing, and small enterprise development.

Second, the positive long-run coefficient on Automated Teller Machines per 100,000 adults (ATM_t) suggests that access infrastructure still matters. The Bank of Zambia (BoZ) and financial service providers should continue to deepen physical and digital access channels, especially in underserved rural and peri-urban areas. However, these efforts should be explicitly linked to active usage, business payments, savings mobilization, and productive finance rather than passive account ownership.

Third, the strong positive long-run role of Human Capital (HC_t) suggests that financial inclusion works better where complementary capabilities exist. Financial inclusion programmes should therefore be integrated with broader human-capital investments, especially financial literacy, digital skills, business capability, and entrepreneurial training. This is particularly important for women, youth, smallholder farmers, and micro-enterprise operators, who often face both financial and knowledge constraints at the same time.

Fourth, the positive long-run coefficient on Foreign Direct Investment (FDI_t) suggests that foreign capital inflows contribute to growth. Policymakers should therefore focus on attracting foreign investment while improving absorptive capacity, domestic linkages, technology transfer, and local value addition so that FDI supports productivity and enterprise growth more effectively.

Fifth, future research and official data systems should prioritize longer and better annual series on financial inclusion, digital finance usage, sectoral credit allocation, service quality, and enterprise borrowing. Improved data would permit more robust ECM and VECM estimation in future studies and would help policymakers distinguish more clearly between the growth effects of access, usage, quality, and productivity.

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