



THE IMPACT OF ATM DENSITY ON FINANCIAL AVAILABILITY IN SUB-SAHARAN AFRICA: EVIDENCE FROM PANEL COINTEGRATION

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ABSTRACT

Financial availability remains a critical constraint to inclusive economic development in Sub-Saharan African, where traditional banking infrastructure is limited, especially in low income and rural areas. Automated Teller Machine (ATMs) provides a cost-effective alternative for expanding access to financial services. This study evaluates the long-run impact of ATM density on financial Availability in SSA. The study utilizes secondary data from the international Monetary Fund Financial Assess Survey (FAS) for 30 SSA countries from 2015 to 2024. The study employed three panel cointegration techniques, specifically Kao, Pedroni and Westerlund to analyze the long run and short run relationship among the variables. The findings reveal a significant long-run impact of ATM density on financial availability. The study concludes that ATM expansion is a vital driver of financial availability in the region. Consequently, the study recommends that government in SSA should increase investment in broadband internet, electricity supply, telecommunications networks and digital payment infrastructure, particularly in underserved rural communities.

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1.1 Introduction

The proliferation of Automated Teller Machines (ATMs) continues to create significant opportunities for individuals and businesses whose financial transactions remain largely cash-dependent, despite the emergence of alternative digital technologies (Mukherjee & Gaur, 2024). This is particularly evident in rural and developing regions, where cash remains the dominant medium of exchange, especially among underserved populations. In such contexts, the availability and accessibility of cash constitute a critical determinant of daily economic activities and business continuity (Uchenna et al., 2025). Even with the global advancement of digital banking, physical currency remains the primary means of transaction in areas characterized by limited digital infrastructure and low digital literacy (Alshari et al., 2024). Consequently, the inability to access cash or basic financial services offered by traditional banks poses a substantial risk to economic stability, particularly in cash-based economies, and may impede regional development. Sharma (2024) argues, the psychological assurance of fund safety and unrestricted access to deposits is fundamental to building public confidence in the formal banking system, thereby encouraging formal savings with commercial banks.

Digital banking is a game-changer in developing economies which can eliminate the elements that restricts the complete access to financial services. Sub-Saharan Africa (SSA) countries, has been a central point for promoting the usage of digital technology for formal financial services among unbanked citizens. Mutinda and Aluoch (2025) note that the popularization of mobile money in Kenya, is due to the success of M-Pesa, which has therefore become a study on how financial services based technologies can encourage inclusion and economic activity. Computer-based banking services are rapidly becoming popular in Asia, Latin America and Africa, in addition to mobile cash, online credit facilities, online savings accounts, and electronic payment systems. The innovations have been used to address the problem of affordability and accessibility which are the key challenges in the traditional banking models.

SSA countries is presently turning out to be one of the most active in regards to the implementation of digital financial services; however, this may be attributed to the fact that the region has its own unique socio-economic factors (Tay et al., 2022). Digital platforms provide a good means of making financial services more accessible to rural populations with big population, where the banking infrastructure is poor, and the

penetration of mobile phones is high (Iddrisu, et al., 2025). The ownership of an account in SSA, especially mobile money account ownership, has grown considerably as indicated in the Global Findex Database (World Bank, 2022); between 23 percent in 2011 and 55 percent in 2021. This speaks of the pace at which the region is rapidly changing towards the use of digital financial solutions with SSA being among the leading regions in the world to adopt mobile money. However, despite this change, regulatory limitations, digital infrastructure deficiency, cybersecurity threats, and long-standing poverty remain to be the barriers to availability (Ozili, 2021). The majority of the existing studies have focused on single country analyses or isolated digital finance channels. For instance Ozili (2021) examined regulatory barriers to inclusion in Nigeria, Okello Candiya Bongomin et al. (2018) focused on mobile money adoption in Uganda and Aron (2018) assessed mobile money effects in Kenya without undertaking a comprehensive regional assessment that capture the full functionality of digital banking channels such as ATMs.. Against this background, this study evaluates the long-run impact off Automated Teller Machine density on financial availability in Sub-Saharan Africa.

2.1 Literature Review

Digital Banking

Digital banking refers to the application of technology-driven channels to conducts banking operations without physical interaction with bank staff Traditional branch-based banking, where customers visit to the banking hall, is gradually being replaced by digital channels such as mobile banking, Automated Teller Machine (ATMs), internet banking, Point of Sales (POS), and Unstructured Supplementary Service Data (USSD) platforms. Digital banking involves the provision of retails and small low values banking products and services in rural, remote and economically disadvantage areas where traditional banking infrastructure are less visible (Evans, 2022). Digital banking infrastructure is critical especially where conventional banking infrastructure is limited (wewege et al., 2020). It encompasses the deployment of digital infrastructure such as ATMs, POS that is critical in areas where banking structures are minimal, enabling financial transactions without necessarily visiting banking premises (Gomber et al., 2017)

Automated Teller Machine (ATM)

Automated Teller Machine (ATM) represents one of the earliest forms of technological innovations in financial access and served as a pathway into automated service delivery, particularly in areas where mobile money penetration was initially limited. However, studies indicate that ATMs face challenges related to high operational costs, maintenance requirement, and high downtimes that restrict long-term sustainability when compared to more versatile channels such as agent banking (Oyadeyi, 2024; Bakoe et al., Sabbaghi, 2025). Nevertheless, ATMs continue to play a critical role in cash-based economies in Sub-Saharan Africa and supplement other digital service outlets.

Financial Availability

Financial availability is conceptualized within the framework of digital payment ecosystems, where reliability, proximity and security determine user retention and depth of use (Demirgüç-Kunt et al., 2022; GSMA, 2024). Similarly, the risk and resilience literature identifies cybersecurity and data security as fundamental aspects of making digital banking technologies sustainably available, as institutional failures or recurring outages can quickly undermine trust and reduce usage (Gomber et al., 2017; Vives, 2019). Recent conceptualizations of financial inclusion extend beyond mere access to encompass affordability, user safety, fee transparency and service persistence. When

service quality is poor, inclusion becomes merely symbolic and exposes users to exploitation (Ozili, 2021; Klapper, 2024). In Sub-Saharan Africa, mobile money, agent networks and outreach programmes have received considerable attention in studies focusing on financial access in rural regions, where the continuity of points of service supplements limited branch networks (Aron, 2018; Okello Candiya Bongomin et al., 2018; Siano et al., 2020). Agent banking and point-of-service networks, which are merchant-based, play a primary role in providing basic transactions in rural areas. The effectiveness of these services depends on specific liquidity management of agents and gender-sensitive product design to serve rural households and women effectively. On this note, it was concluded that financial availability refers to the accessibility of cash to small and micro scales businesses particularly to the economically low income areas or un-served populations.

Theoretical Review

Access to Finance Theory

Access to finance theory, attributed to Beck et al (2007), is an evolving intellectual framework that seeks to explain why individuals, households and firms lack access to formal financial systems, the consequences of such exclusion, and how policy and market innovation can be used to

provide access in ways that are both efficient and equitable. Its classical foundations lie in the study of imperfect information in credit markets. In their model of credit rationing, Stiglitz and Weise (1981) demonstrate that banks may refuse credit or ration borrowers even when interest rate fail to clear the market, because raising interest rate attract undesirable and risky borrowers. This observation form the basis for subsequent studies that conceptualize lack of access as an endogenous outcome of market structure and information asymmetries, suggesting that solution should focus on screening, monitoring and incentive design rather than merely increasing supply (Beck et al., 2007; Stiglitz and Weise (1981). This theory is relevant to this study because it explain financial exclusion in Sub-Saharan Africa as a consequence of information asymmetry, high transaction costs and limited banking infrastructure. ATM density represents a market and technological innovation aimed at reducing these barriers by lowering transaction cost, improving proximity and enabling screening of low-value transactions without requiring full branch infrastructure. Therefore, increased ATM density is expected to enhance financial availability, particularly for under-banked and un-served population in economically low-income areas, consistent with the theory proposition

that innovative delivery channels improves access.

Financial Intermediation Theory

Financial intermediation theory, which has its roots in Gurley and Shaw (1960), posits that financial intermediaries are important in mobilizing savings from surplus units and efficiently allocating them to deficit units. This process facilitates investment, consumption smoothing and overall economic expansion. The theory is formulated to emphasize the role of formal financial institutions, primarily banks, in managing transaction costs, risk and information asymmetries in financial markets (Diamond, 1984; Levine, 2005). The theory underpins this study by explaining that ATMs function as cost-reducing intermediation channels. In Sub-Saharan Africa, where physical branches are sparse and transaction costs are high, ATM density extends the intermediation function of banks beyond brick-and-mortar branches. By reducing information asymmetry and operational costs, ATMs enhance the capacity of banks to make cash accessible to under-banked populations, thereby improving financial availability.

The Diffusion of Innovation (DOI) Theory

Rogers (1962) proposes a theoretical framework for studying the implementation of new technologies, such as digital banking, within various social and economic settings. In its most basic form, diffusion of innovation theory describes a communication process involving four elements: innovation attributes, communication channels, time and the social system. Its relevance to digital banking in developing economies lies in its ability to explain variations in consumption patterns and the differing rates at which individuals and societies adopt technological changes. DOI theory explains the adoption trajectory of ATM technology in Sub-Saharan Africa. The long-run impact of ATM density on financial availability depends on how quickly the innovation diffuses, which is influenced by perceived relative advantage, compatibility, complexity and observability. The theory therefore justifies the examination of long-run effects, as financial availability improves only as ATM adoption spreads across the social system.

Theoretical Framework

This study is anchored on Access to Finance Theory (Beck et al., 2007) as the main theoretical underpinning, with Financial Intermediation Theory (Gurley & Shaw, 1960) and Diffusion of Innovation Theory

(Rogers, 1962) serving as supporting theories. Access to Finance Theory is selected as the lead framework because it directly addresses the core problem of financial exclusion due to market imperfections, high transaction costs and infrastructural deficits which is precisely the problem ATM density seeks to solve in Sub-Saharan Africa. While financial intermediation theory explains how ATMs reduce costs as intermediaries, and DOI theory explains how fast the technology spreads, Access to Finance Theory explains why financial availability remains limited and how technological innovation can sustainably improve access in economically low-income and unserved populations.

Empirical Review

Lamba et al. (2025) examined financial inclusion and economics growth in Nigeria from 1992 to 2022 using analytical design anchored on financed-led growth theory and data from CBN statistical bulletin. Applying panel unit root test and Autoregressive Distributed Lag (ADRL) bound test, the study discovered that increases in financial inclusion promote economic growth. The study argued that government should reassess financial inclusion strategies and prioritize productive sectors, such as agriculture, manufacturing and technology.

Haruna and Dibal (2024) explore the effect of financial technology on financial inclusion in Nigeria using data spanning 2009 - 2019. They employ ARDL technique. Three financial technology indicators were addressed using ATM, POS and mobile banking as explanatory variables on inclusion. The findings found that volume of ATM transactions significantly impacts on financial inclusion both at the long-run and short-run while POS and Mobile banking do not impact on inclusion in both long-run and short-run. It however implies that usage of financial digital technology as a medium for financial inclusion has shown minimal contribution in Nigeria.

Gyamerah and Tetteh (2024) examined the role of institutional quality, mobile money and financial inclusion in SSA from 2002 to 2022. Using annual data on four financial inclusion indicators, six institutional quality measures and mobile money transaction, the study employed two stage least squares and random effect theory models. The study found that institutional quality has a direct effect on financial inclusion with countries having stronger rules of laws, effective governance and lower corruption performing better.

Oyadeyi (2024) analyzed financial inclusion and banking innovation, economic growth in

Nigeria, between 2009 and 2021, using a Mixed Data Sampling (MIDAS) analysis. The result revealed POS and ATM transactions indicators have a positive effect on economic growth while POS and web payments impact were limited. The effect varies across models with POS channel having impact overall. This result support the view that digital finance improves economic activities but also indicates risk that might affect household savings differently.

Atta and Ibrahim (2024) assessed financial inclusion and economic development in Nigeria using money supply and credit to private sector as proxies for inclusion. Anchored on finance-led growth theory, the study found that financial inclusion is related to economic development in both short and long run. The authors argued that inclusive policies are needed to address demographic inequalities and improve access to finance, nothing implications for aggregate welfare and savings mobilizations.

Sassi and Goaid (2023) examined financial development, ICT and economic growth in 20 SSA countries from 2016 to 2021 using panel dynamic model estimated by system GMM. The study found a negative direct effect of financial development on growth, but a positive and significant direct effect of ICT variables. This implies that African

countries may benefit from ICT development once appropriate policies are implemented alongside financial development.

Doku et al. (2023) analysed the impact of digital financial technology on financial inclusion in 34 SSA countries between 2004 and 2021. They employed two-stage system GMM estimator to examine the endogeneity and dynamic relationships. The study found that, digital finance enhances financial inclusion, albeit in environments where institutional quality is greater. The study indicates that rule of law, regulatory frameworks and government efficiency; enhance financial inclusion effectiveness on digital finance.

Iwedi (2023) assessed the effect of digital banking on financial inclusion in Nigeria. Using quarterly data sourced from CBN Statistical Bulletin from 2009 to 2021. The study examined four digital banking medium; ATM, POS, WEB/Internet and mobile banking, with financial inclusion proxy by ratio of total bank deposit of GDP. Granger causality test was estimated to determine the effect of digital banking technology on financial inclusion. The study revealed that, digital banking has a strong and positive impact on financial inclusion.

Nwadike and Osuala (2023) examined digital financial services and economic development on SSA; a panacea or placebo in five SSA

countries between 2009 and 2020, using fixed effects panel regression as measurements on ATM and POS digital financial service. The findings showed that POS have significant and positive impact on the development of the economy, overdependence on the use of ATM transactions can have a negative impact on the financial inclusion, which is probably caused by the costs involved and the problem of accessibility.

Akinrinola et al. (2023) investigated how digital financial technologies affect households saving behavior behaviour in Nigeria between 2009 and 2019. Anchored on the Technological Acceptance Model and Diffusion of Innovation Theory, the authors employed secondary data analysed through multiple regression. They found that, ATMs, internet banking and mobile money improved savings which they attributed to impulse spending facilitated by POS.

Evans (2022) analyzed social and institutional drivers on digital financial inclusion for 42 African countries from 1995 to 2018. Using system GMM to estimate the panel data, the findings indicated that literacy, infrastructure, unemployment and living standard has significant influence on digital financial inclusion, while institutional quality such as political stability, control of

corruption, regulatory quality, government effectiveness and rule of law, also yield positive effects.

Bede et al. (2020) examined the causal relationship between digital finance and financial inclusion across 27 SSA countries using World Bank data for (2007-2017). The study employed Granger Error Correction with system GMM and found a positive long run link between digital finance and financial inclusion. The study suggested that, regulators in SSA countries should encourage banks to expand ATM networks and limit over-the counter cash transaction.

Existing studies on digital finance and stability predominantly focused on Asia and Islamic banking contexts, while SSA-based studies emphasized mobile money and growth. There is limited evidence on the time duration effect of ATM density on financial availability in SSA using a dynamic panel framework. Therefore, on the methodology, Panel Co-integration test of Kao, Pedroni and Westerlund was used to analyze the short and long run impact of ATM density and financial availability in 30 Sub-Saharan African countries as against ordinary least square techniques mostly used.

3.1 Methodology

Quantitative research design was utilized based on the panel data approach. Since the

study is interested in investigating causal or quasi-causal relationships between the indicators of ATM density and financial availability. The study relies on secondary sources that are founded in reputable international organizations and databases. The main sources of data were from the World Bank database on Global Findex, where information on account ownership, savings, credit use, and mobile use were found; global financial reports, where information on the use of ATM and money agent registration are found.

Purposive sampling techniques were adopted, this is to capture country with updated digital data to be included and also examine language barriers. The population of the study is 30 Sub-Saharan African countries with a representative of 15 Anglophone and 15 Francophone nations which includes Nigeria, Kenya, Ghana, South Africa, Botswana, Zimbabwe, South Sudan, Tanzania, Namibia, Uganda, Central African Republic, Liberia, Malawi, The Gambia, Sierra Leon, and Seycheles, Lesotho, Benin, Cameroon, Republic of Congo, Cote d Ivoire, Mauritius, Chad, Eswatini, Madagascar, Mali, Niger, Rwanda, Senegal, Togo as the sampling population from (2015 to 2024), since the year represent the average up to date data. Also to achieve this, panel unit root test was carried out to test

for stationarity of variables and three methods of panel cointegration technique- Kao, Pedroni and westerlund were adopted to analyze the long run and short run impact.

Model Specification

The research hypothesis, corresponding to the research objective, is meant to capture the long-run impact of ATM density on financial availability in SSA.

Descriptive Statistics

Table 1: Statistical Properties of Financial Availability Variables

	AVAILABILITY	ATM_1K_SQ2	MOBILE_AGENTS	INFRA_QUALI
Mean	0.000	19.351	745.619	45.054
Maximum	8.872	318.573	25125.250	100.000
Minimum	-0.538	0.000	0.000	0.000
Std. Dev.	1.009	51.299	1,944.704	28.470
Skewness	3.840	3.551	7.827	0.085
Kurtosis	24.954	14.894	87.969	2.130
Jarque-Bera	6761.847	2398.709	93308.730	9.758
Probability	0.000	0.000	0.000	0.008

Source: Author computation 2026

Table 1 above shows the indicators and component measures. The standard deviation of the number of registered money agent outlets has the highest value with 1,944.704. This indicates that this variable most widely departs from its expected number and the positive skewness value of 7.827 is an indication that it is positively far above the

$$y_{i,t} = \alpha_i + \beta_i x_{i,t} + u_{i,t}$$

The y is the dependent variable while the x is the independent variable, α_i is the fixed panel term while $u_{i,t}$ the error term. All variable is integrated at order 1; implying that they must contain unit-root. Three methods of panel cointegration are prominent and these are the Kao, Pedroni and Westerlund Panel Cointegration tests.

average value that is expected for the Sub-Saharan African economies. It is understandable as this is an aspect of financial inclusiveness that has created jobs for the teeming population of labour in the SSA countries.

To explain the indicator of financial availability measure, the number of

automated teller machine available per 1,000 kilometers square has a standard deviation of 51.30 with skewness value of 3.55. This suggests that the ATM within the geographical spread and reach of the banking population in SSA countries exceeded the expected average needed. This further reinforces the financial inclusiveness of the deposit money banks in SSA countries in ensuring that their teaming customers are not denied of means to partake in the financial intermediation process through the provision of available facilities that are required to be included. With regards the composite measures of financial availability. The skewness values for the two measures of ATM per 1000 quare kilometer and

registered mobile money agent outlet per 1000 square kilometer are positive with the values of 3.551 and 7.827 for financial availability. This implies that registered mobile money agent have more coverage than ATM. This is confirmed by the formal test of Jarque-bera statistics that reject the null hypothesis of normal distribution for these indicators and composite measures of financial availability; even at the 10 percent level of significance. However, infrastructural quality with the standard deviation of 28.47 and skewness value of 0.085 implies that the African sub-region barely meets with infrastructural needs as it gravitates around the expected value of 45.054.

Data Stability Tests

Panel Unit Test

Table 2: Panel Unit-Root Tests

S/N	Variables	Panel 2a: Levin, Lin and Chu (LLC) (Common) Unit-Root Test			Panel 2b: Im, Pesaran and Shin (IPS) (Individual) Unit-Root Test		
		<i>Ho: Unit – Root</i>			<i>Ho: Unit – Root</i>		
		<i>I(0)</i>	<i>I(1)</i>	<i>Ho: r</i>	<i>I(1)</i>	<i>I(1)</i>	<i>Ho: r</i>
1.	<i>atm_1k_sq2</i>	-7.509***	-	Rejected	-0.393	-2.728***	Rejected
2.	<i>availability</i>	-7.588***	-	Rejected	5.308	-0.242	Do not Rejected
3.	<i>infra_quali</i>	38.960	38.512	Do not Reject	3.835	-9.252***	Rejected
4.	<i>mobile_agents</i>	5.787	-3.024***	Rejected	5.564	-0.662	Do not Rejected

Source: Author computations. Note: ***, **, * denotes significance at the 1%, 5% and 10% levels respectively.

Two major tests were employed and these are the Levin, Lin and Chu (LLC) common unit-root test and the Im, Pesaran and Shin (IPS) individual unit-root test. The results of these two tests do not converge together. Rather, there are instances where the null hypothesis for unit-root could not be rejected, under common unit-root test of LLC, for the variables such as infrastructural quality, even at the 10 percent levels and even for integration at the first order. However, the null hypothesis of the unit-root for this

variable were rejected; even at the 1 percent levels, for the individual panel-unit root of IPS.

Conversely, the null hypothesis for unit-root could not be reject for a number of variables under the panel individual unit-root test of IPS; neither at the 10 percent level nor at the first level of integration. These are the variables of financial availability (indicated as availability), and registered mobile money agents outlet (indicated as mobile_agents)

Panel cointegration

Table 3: Long-Run Equilibrium cum Short-Run and Long-Run Impact Analyses

Panel 3a: Long-Run Panel Cointegration Tests		
Panel Cointegration Tests	Tests	T-stat. values
Westerlund Cointegration	Variance ratio	4.448***
Pedroni Cointegration	Modified Phillip Peron t	8.219***
	Phillip-Peron t	-4.331***
	Augmented Dickey Fuller t	-7.480***
Kao Cointegration	Modified Dickey Fuller t	-3.509***
	Dickey Fuller t	-4.944***
	Adjusted Dickey Fuller t	-6.892***
	Unadjusted Modified Dickey Fuller t	-5.048***
	Unadjusted Dickey Fuller t	-5.588***
Panel 3b: Short-Run Impacts		
Short-Run Impacts		
Variables	Coefficients	Z-statistics
<i>cons</i>	-9.785	-1.67*
<i>ECT</i>	-0.046	1.76*
<i>atm_1k_sq2</i>	1.075	1.48
<i>infra_quali</i>	0.013	1.79*

Source: Author Computations. Note: ***, ** and * denote significance at the 1%, 5% and 10% levels respectively.

As detailed in Table 3 there exists long-run equilibrium condition between ATM density and financial availability, on the one hand, and other variables included in the model. There distinct panel cointegration tests have been conducted and these results are robust to the existence of long-run impact. Specifically, the null hypothesis of no cointegration have each been rejected for all the panel cointegration tests of Westerlund, Pedroni and Kao, at the 1 percent level of significance (see Panel 3a). The study also recognizes short run impact of Error Correction term among the variables, particularly; infrastructural quality with 0.013 coefficients and 1.79 Z-statistics value. This is a positive and significant impact; at the 10 percent level. This indicates that the major and only short-run determinant of financial availability in SSA countries is the provision of quality infrastructural facilities that would provide the needed digital architecture; especially in the short-run situation. Intuitively, this finding of short-run impact of infrastructural quality aligns with and further strengthens theoretical plausibility that infrastructural development impacts on the economy in a long-run situation, as enunciated in the growth and development literature. Consequently, it becomes imperative that policymakers

should continually develop the physical infrastructure for the growth and development of the economy; including ensuring financial inclusiveness.

Discussion and Findings

The objective, which evaluate the long-run impacts of Automated Teller Machine density on financial availability in Sub-Saharan Africa, The justification is that many deposit money banks have started reducing their physical infrastructure so as to reduce the overhead cost of production and to further synthesize their banking operations in tandem with global dynamics where digital operations appear to hold sway, As detailed in Table 3, there exists long-run equilibrium condition between ATM density and financial availability, on the one hand, and other variables included in the model. Three distinct panel cointegration tests have been conducted and these results are robust to the existence of long-run impact. Specifically, the null hypothesis of no cointegration have each been rejected for all the panel cointegration tests of Westerlund, Pedroni and Kao, at the 1 percent level of significance (see Panel 3a). More so, the short-run error correction term (indicated as ECT) is properly signed with -0.046 coefficient and significant at the 10 percent level of significance with 1.76 Z-statistics value. This

is highly instructive as it suggests that only 4.6 percent of shock would be reversed annually and it implies that it would take about 22 years for financial availability to revert back to equilibrium. once affect by shock received through digital banking. Of all the variables in the short-run, only infrastructural quality would impact on financial availability in the short-run situation.

Specifically, infrastructural quality has 0.013 coefficients and 1.79 Z-statistics value. This is a positive and significant impact; at the 10 percent level. This indicates that the major and only short-run determinant of financial availability in SSA countries is the provision of quality infrastructural facilities that would provide the needed digital architecture; especially in the short-run situation. Findings of this study is in line with the work of Lamba et al. (2025); Nyeche et al. (2025) and Oyadeyi (2024) but contradicted by the study conducted by Sassi and Goaid (2023) and Bede et al. (2020) who reported that the rate of financial availability is ameliorated by the level of human capital through increases in digitalization. Intuitively, this finding of short-run impact of infrastructural quality aligns with and further strengthens theoretical plausibility that infrastructural development impacts the economy in a long-run situation, as enunciated in the growth and

development literature. Consequently, it becomes imperative that policymakers should continually develop the physical infrastructure for the growth and development of the economy; including ensuring financial inclusiveness.

5.1 Conclusion and Recommendations

The results of the long run impact analysis suggest there exist long-run equilibrium condition between ATM density and financial availability, on the one hand, and other variables included in the model. Financial availability in SSA countries is the provision of quality infrastructural facilities that would provide the needed digital architecture; especially in the short-run situation. Intuitively, this finding of short-run impact of infrastructural quality aligns with and further strengthens theoretical plausibility that infrastructural development impact the economy in a long-run situation, as enunciated in the growth and development literature. Consequently, it becomes imperative that policymakers should continually develop the physical infrastructure for the growth and development of the economy; including ensuring financial inclusiveness.

The study therefore recommended, among other things, that monetary authorities in emerging and developing economies in Sub-

Saharan Africa should embrace digital financial technologies by encouraging commercial banks to deploy more ATMs and discouraging cash payments and withdrawals within established thresholds over bank counters in their respective countries.

The study found that infrastructural quality is highly significant and has a short-run effect on ATM density and remains a critical determinant of financial availability. For this reason government in SSA should therefore increase investment in broadband internet, electricity supply, telecommunications network and digital payment infrastructure, particularly in underserved rural communities. Such investment will strengthen the digital ecosystem required for internet banking, mobile banking and other digital financial service to flourish.

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