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EFFECT OF FINANCIAL INNOVATION ON ECONOMIC GROWTH: EVIDENCE FROM AFRICAN COUNTRIES

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Abstract

Financial innovation is a product of technology and the question whether financial innovation spurs economic growth is subject to level of technology in the financial sector of an economy as well as other factors. On this note, this study examines the impact of process financial innovation on economic growth in some selected African countries. The study used annual panel data obtained from the World Bank Development Indicator comprising of seventeen cross section countries covering the period of fifteen years from 2004 to 2018. Generalized Method of Moment (GMM) was employed to analyze the panel data system. The result shows that financial innovation has significant impact on economic growth of selected countries. Automated Teller Machine (ATM) which is a major measure of our process financial innovation has significant impact on economic growth. Number of Bank branches on the other hand has positive but insignificant impact on the economic growth. Financial innovative products such a domestic bank credit also contributes significantly to the economic growth of African countries. It is therefore recommended that policy makers should encourage establishment of more ATM terminals, increase the number of bank branches and improve the credit to private sector of the economy.

Keywords: *Financial Innovation, Economic Growth, ATM, Bank Branches and Credit to Private Sector*

JEL Classification: *G21 O47 G2*

1. Introduction

What is the effect of financial innovation on economic growth? To the best of our knowledge, the answer to this question is not very clear in empirical literature. Various aspects of financial innovation have been explored such as institutional innovation (De Young, 2001) product innovation and process innovation (Frame and white, 2004, 2009; Akhavein et al,2005). The various studies have documented mixed findings especially studies that have tested the bright side view of financial innovation. One prominent and comprehensive study by Beck, Tao, Chen and Frank (2016) reported positive relationship between financial innovation and economic growth. Most of the past studies failed to employ automated Teller Machine as product financial innovation which is one of the commonest financial innovation currently widely adopted in most developing countries that is expected to create financial access, services and credit opportunities that can spur economic growth.

Most of the past studies in the literature were carried out using samples of countries from developed and developing counties. Very limited studies focused on Africa or included samples of countries in Africa. Given the continuous active debate among practioners, policy makers and academics on the role of financial innovation in the growth process, there is a striking paucity of empirical studies linking financial innovation to growth. Most past studies

emphasis technical, institutional and product innovations, financial development and financial inclusion as catalyst of economic growth. They overlooked the role of process financial innovation in the economic growth process.
The motivation for assessing the nexus between financial innovation and economic growth stems from testing the validity and application of the two theoretical perspectives in a developing economy context with focus on process financial innovation specifically the role of Automated Teller Machine as process financial innovation that can engender economic growth. The traditional innovation growth view see the bright side of financial innovation and posits that financial innovation may help to improve services of banks, facilitate risk sharing and aid allocative efficiency and the growth process. Contrary to the traditional view is the financial innovation fragility theoretical perspective that focus on the dark side of financial innovation. In specific terms, financial innovation is perceived to be the causal factor that often lead to financial crisis because the innovation in the financial sector expand the credit opportunities and risk that catalyse the boom and burst in the economy
(Brunnermeier,2009).
In the light of the fact that financial innovation could have bright or dark sides, it is important to assess whether financial innovation can engender growth or not thereby necessitating a study of this kind. This study examines the impact of process financial innovation on economic growth in some selected Africa countries. Apart from the introduction, this paper is divided into four other parts. Section two is the literature review. Section three is the methodology while section four discusses the results and findings while section five concludes the paper.

2. Literature Review

The theoretical literature has affirmed that there are two opposing hypotheses on financial innovation either the traditional innovation-growth or innovation-fragility view. Literatures from (Merton, 1992; Berger, 2003) on traditional innovation-growth posited that financial innovation improves the quality and variety of banking services facilitates risk sharing, reduce agency cost completes the market and improves allocative efficiency and economic growth. While on the other hand innovation-fragility centred on the 'dark' side identified financial innovations as the major cause of Global Crisis 2007 to 2009 as a result of unprecedented credit expansion, likewise helping banks and investment banks design structured products taking advantages of investors' misapprehension of financial markets. The introduction of new ideas, instruments, and solutions for the existing problems make innovation the key driver for economic growth since it changes business competitiveness and creates more value for enterprises. The traditional economic view of innovation growth stated that financial innovation improves the quality of financial products and services (Schrieder and Heidhues 1995; McGuire and Conroy 2013) accelerate the financial development process for capital accumulation and allocation processes. However, Institutional innovation, like various form of innovation, in the financial systems accelerate financial process with improvements on services provided, such as internet banking and mobile banking services (Raffaelli and Glynn 2013) thus enhancing efficiency of financial institutions through improved payment mechanisms (Sabandi and Noviani 2015).
Intently, idea of financial innovation is not a new one, but over the last decade, it has been theoretically reviewed in financial literature of Wong, Ho., and Autio, (2005) as discussed in the theoretical models of (Solow, 1956; Romer, 1986), which emphasized the connection between technological innovation and economic growth, likewise the neoclassical model of economic growth is sustained by capital and labour force. However, Nadiri (1993) used Cobb-Douglas function to highlight the link between innovation, output and productivity growth with a conclusion that economic growth is influenced by the growth rate of financial innovations, which are determined exogenously. On the other hand, in the endogenous growth model has developed by Romer, (1986) concluded that economic growth is endogenously dogged and is predisposed by agents' decisions to exploit profits, taking into consideration characteristics of entrepreneurship by modelling the innovation process based on microeconomic data with the aid of financial institutions. The empirical studies from financial literature have pointed out the relationship between financial innovation and economic growth using both macroeconomic and microeconomic data in references to developed and emerging markets. The classical economic view of innovation growth posited that financial innovation improves the quality of financial products and services (McGuire and Conroy 2013), expedites the financial development process, improves capital accumulation and allocation processes (Allen 2011), and increases the level of efficiency in financial institutions (Ajide, 2016). The efficiency of financial institutions has an impact on financial development through better payment mechanisms that expedite both domestic and international trade (Sabandi and Noviani 2015).

Chou (2007) model financial innovation and economic growth and evaluated why the financial sector matters to the real economy using conventional Cobb-Douglas production function. His finding revealed that financial innovation raises the efficiency of financial intermediation by increasing the variety of financial products and services, resulting in improved matching of the needs of individual savers with those of firms raising funds for expanding future production. The study should have examine a cross country and estimation techniques not only growth model. Ang (2014) examined innovation and financial liberalization using error-correction model (ECM) and auto-regressive distributed lag in order to test the existence of a long-run relationship. The results lend some support to the argument that some form of financial sector reforms may help stimulate economic growth via increasing technological innovation. This study should have been a cross country studies. There is time lag between 2005 to 2014 especially global financial crises.

Galindo and Méndez (2014) analyzed the relationships between entrepreneurship, innovation and economic growth, and to show the feedback effects in these relationships in 13 developed countries 2002 to 2007. Gross domestic product was proxied as independent variables while dependent variables are Gini index, money supply. Method of estimation techniques: Regression Analysis. The analysis shows that several factors have positive impacts on innovation and entrepreneurship, including monetary policy and social climate. The study should have used dynamic ordinary least square for it estimation and likewise other techniques such ARDL, Granger Causality to test the relationship on the variable. Akinwunmi, Muturi and Ngumi (2016) considered the adoption of Financial incentives and financial innovation in Nigeria banking sector between (2005– 2010). Financial incentives as an independent variable were captured by interest rate while financial innovation and deepening as the dependent variables were measured by customers and deposit base. The study revealed that in Nigeria, financial incentive - interest rates were effective for financial innovation adoption by increasing banks customers' deposit base, but interest rate is not enough to draw more people to the bank (financial penetration), i.e. improving customer base. The literature should have been encompassed with status of financial innovation and incentives in Nigeria banks because the introduction of recapitalization in December 2005 makes Nigeria banks more markets orientated with financial innovative products and incentives. Ajide (2016) investigated the effect of financial innovation augmented with bank competition on sustainable development in eight West African countries. His study reveals positive but insignificant impact.

Pradhana et al (2018) sampled 49 European countries between 1961 and 2014 using vector error-correction model panel unit root and panel co-integration tests to determine the interactions between innovation, financial development, and economic growth. Their findings revealed that both innovation and financial development are key drivers of per capita economic growth in European countries in the long run.

Pradhana et.al (2018) should have used panel data, basically its allow for controlling for individual or time heterogeneity, which variables in the model are incapable of capturing. Furthermore, as Baltagi (2008) asserts, panel data give informative more data, more variability, less collinearity among the variables, more degrees of freedom and more efficiency. Oseni (2018) examined the relationship between financial innovations and the sustainable economic development in Nigeria between 2006 and 2016 using ATM Banking, Web (Internet) Banking, POS Banking and Mobile Banking as proxies of financial innovations and the GDP as the proxy for the nation's economic growth and development. Techniques: multiple linear regression model adapted from Muiruri and Ngari (2014). The study established that a positive and significant relationship exists between all the variables and GDP with the exception of Mobile Banking. However, variables used for this study does not include risk management. From the persistent of literature reviewed, it shows that efficient financial system is the outcome of continuous financial innovation that create more financial institutions and also develop financial service and instruments that can support economic growth (Jedidia, Boujelbène., Helalid 2014). Bara and Mudxingiri (2016) examined the relationship between financial innovation and economic growth in Zimbabwe and positive impact was established. Studies of Qamruzzaman, & Jianguo, (2017); Ebubekir & Burçay (2019) and Ozurumba & Onyeiwu (2019) revealed that financial innovation can engender economic growth. Furthermore, mixture of positive and negative relationship between financial innovation and economic growth, therefore it is also necessary to further carried out this research and inculcate other variables which is not previously captured by previous authors especially for developing countries Nigeria, Kenya, South Africa, Bostwana and Namibia.

3. Methodology

This study used annual panel data comprising of seventeen cross section (17 countries) covering the period of 2004 to 2018 (t=15,n=17) which covers theera of financial liberalization and development in many countries as well as output expansion, high level of compliance to information communication technology, money growth, and an increasing volume of investment. The 17 African countries were selected based on the availability of their data. The data used for this study were obtained from World Development Indicator (WDI).

3.1.Model Specification

This study used annual panel data comprising of seventeen cross section (17 countries) covering the period of 2004 to 2018 (t=15,n=17) which covers the era of high level of compliance to information communication technology in many developing countries. The 17 African countries were selected based on the availability of their data. The data used for this study were obtained from World Development Indicator (WDI).

3.2. Model Specification

The model of this study based on the endogenous growth model of Solow (1950). The theory opines that growth in an economy is a function of Capital, labour and technology. The Solow model is expressed as:

$$y = f(K, L, A) \qquad (1)$$

Where y represent growth, k represent capital, L stand for labour and A represent technology.

Based on the theory, financial innovation is represented by technology in the model. This simply means that technological advancement induces the growth rate in the economy. In order to attain the effect of financial innovation on economic growth in selected African countries, the model is modified and expressed as:

$$y = f(ATM, GCF, MOS, INF, LAB) \quad (2)$$

The Solow model is premise on the assumption of Cobb–Douglas production function, the modified Solow model in equation (2) is thus expressed in Cobb–Douglas form and expressed as:

$$y_t = f(K_t^{\alpha}, LAB_t^{\beta}, ATM_t, MOS_t, INF_t) \qquad (3)$$

Where y_t is the growth rate at time t, K_t^{α} is the capital stock at time t which is proxied by Gross Capital Formation (GCF), LAB_t^{β} is the labour at time t which is proxied by Labour, ATM_t is the proxy for technology in the growth model, MOS_t is the money supply at time t and INF_t is the inflation rate in the economy.

In order to achieved the predetermined objectives of this study, the model is restated in panel form and expressed as:

$$y_{i,t} = \beta_0 + \beta_1 ATM_{i,t} + \beta_2 GCF_{i,t} + \beta_3 LAB_{i,t} + \beta_4 MOS_{i,t} + \beta_5 INF_{i,t} + \mu_{i,t} \qquad (4)$$

Where β_1 *to* β_6 represent the coefficients of the explanatory variables

$ATM_{i,t}$ represent automated teller machine for country i at time t

$GCF_{i,t}$ represent gross fixed capital formation for country i at time t

$LAB_{i,t}$ represent labour for country i at time t

$MOS_{i,t}$ represent money supply for country i at time t

$INF_{i,t}$ represent inflation rate for country i at time t

$\mu_{i,t}$ is the error term for country i at time t

This study uses GDP per capita as a proxy for economic growth as used by previous studies (Qamruzzaman & Jianguo, 2017; Bara & Mudxingiri 2016; Ajide 2015). An economy is assumed to be improving if it experiences increases in its GDP per capita. Financial innovation is expected to brings about growth in the economy as a result of innovation of the existing financial product as well as invention of new product which is expected to contribute positively to the economic growth of a nation (Laeven, Levine & Michalopoulos, 2015 as cited in Qamruzzaman and Jianguo, 2017). Previous studies have used different proxies for financial innovation. This study used one proxies for financial innovation which is Automated Teller Machine based on availability of data and other four control variable in order to prevent endogeneity problem in the model. The control variables are labour, capital, money supply and inflation.

This study also employed the panel estimation technique in order to estimate the impact of the independent variables on the dependent variable. It is to be noted that it is imperative to carry out unit root test in order to ascertain the order of integration of these variables. This study estimated the dynamic panel data system generalised method of moment (GMM) (Arellano and Bover, 1995; Blundell and Bond 1998) which was based on the prior model developed by (Arellano and Bond 1991) where differencing of all the regressors was introduced and called difference GMM. The model of Arellano and Bond was based on the following assumptions; that the observation is greater than the time (N>T), linearity in relationship, inclusion of lagged value of the dependent variable, regressors are not strictly exogeneous, fixed individual effects and problem of autocorrelation & heteroskedasticity within a variable (Roodman, 2009). Imposing the strict exogeneity assumption leading to violations and discrepancy in our fixed-effect model which leads to generation of a single equation dynamic GMM estimators by using a common factor representation (Blundell and Bond, 1998). The dynamic panel output model is expressed as:

$$y_{i,t} = \rho + \omega y_{i,t-1} + \theta_1 ATM_{i,t} + \theta_2 GCF_{i,t} + \theta_3 LAB_{i,t} + \theta_4 MOS_{i,t} + \theta_5 INF_{i,t} + \mu_{i,t} \qquad (5)$$

$$i = 1 \ldots \ldots n, t = 1 \ldots \ldots T$$

ρ is the constatnt parameter, ω and θ are the output elasticities

The violation of the assumption of strict orthogonality led to the introduction of varying parameters by taking the semi-derivatives of the variables to account for variances in units and measurements.

$$\mu_{i,t} = \varepsilon_{i,t} + \upsilon_{i,t} \qquad (6)$$

The disturbance term $\mu_{i,t}$ comprise of two orthogonal components; the fixed effects that is time-invariant which is $\varepsilon_{i,t}$ and the idiosyncratic shocks which is represented by $\upsilon_{i,t}$ which is assumed to be independent and normally distributed with zero (0) mean and constant variance.

Adjustment of the GDP is expected to be affected by factors such as the ATM, capital, labour, money supply, and inflation. GDP adjustment to changes in these factors is dependent on two basic conditions, first is the passage of time which give rise to the introduction of the lagged values of the factors as independent variables, and second is on the difference between equilibrium of GDP and the previous year actual GDP which led to the introduction of the dynamic GMM in which lag of the dependent variable is also included as independent variable in the model.

Application of OLS in our estimation could lead to "dynamic panel bias" which usually occur due to correlation between the lagged value of the dependent variable and the fixed effects in the error term which leads to the violation OLS assumption which is necessary for attaining an unbiased estimate, leading to endogeneity problem. Introduction of lagged variable as an instrument in the strict orthogonal assumption helps in solving this problem which is incorporated in the system GMM (Blundell and Bond, 1998; Roodman, 2009).

This study therefore estimated the impact of financial innovation on economic growth in selected African countries using the System GMM based on the satisfaction of some assumptions. The observation is greater than the time (N>T) which is 17 countries by 15 years, ability to solve endogeneity, heteroscedasticity and serial correlation problem and produce an estimate which reduces the correlation between the instrument and the disturbance term to zero. The dynamic GMM model is expressed as:

$$y_{i,t} = \alpha + \beta_3 Y_{i,t-1} + \beta_1 X_{i,t} + \beta_2 Z_{i,t} + \mu_{i,t} \qquad (7)$$

$y_{i,t}$ is represent growth

$\beta_3 Y_{i,t-1}$ represent the lagged value of growth

$\beta_1 X_{i,t}$ represent the independent variables which are ATM, GCF and LAB

$\beta_2 Z_{i,t}$ represent the control variables which are MOS and INF.

$$lnGDP_{i,t} = \alpha + \beta_6 lnGDP_{i,t-1} + \beta_1 ATM_{i,t} + \beta_2 lnGCF_{i,t} + \beta_3 MOS_{i,t} + \beta_4 INF_{i,t} + \beta_5 lnLAB_{i,t} + \mu_{i,t} \quad (8)$$

3.3. A priori Expectation

The *a priori expectation* shows the expected signs and significance of the values of the coefficient of the parameter under review on the part of the empirical evidence and theoretical assertion.

Table 1: A priori Expectation

Variable	**Acronym**	**Expected Sigs**
Automated Teller Machine	ATM	**(+)**
Commercial Bank Branches	CBB	**(+)**
Domestic Credit Provided by Private Sector	DCP	**(+)**
Gross Capital Formation	GCF	**(+)**
Labour	LAB	**(+)**
Money Supply	MOS	**(+)**
Inflation	INF	**(-)**

4. Results and Discussion

4.1. Summary Statistics For The Data

Table 1: The descriptive statistics shows the list of variables used in the study. Data were collected for the period of 2004 to 2018 from the World Bank Development Indicator. Economic growth is proxies by GDP per capita while the financial innovation variables are Automated teller machines, Commercial bank branches and Domestic credit provided by financial sector. The control variables are gross capital formation, money supply, inflation and labour

Variables	*bs.*	*Mean*	*Std. Dev.*	*Minimum*	*Maximum*

Lngdp	255	3.366381	0.376227	2.610444	4.081519
Atm	255	12.84329	15.22297	0.000000	68.92636
Cbb	255	7.070232	5.398077	0.000000	24.87064
Dcp	255	32.28659	36.63898	-114.6937	119.6001
Lngcf	255	8.470157	3.697725	0	11.01
Mos	255	47.84626	34.98165	0	251.618
Inf	255	7.648322	8.018531	-60.4964	43.54211
Lnlab	255	6.860245	0.4807163	5.805922	7.766441

Table 1 above depict the data used in the study alongside the mean, standard deviation, minimum and maximum values.The correlation Matrix shows the list of variables used in the study. Data were collected for the period of 2004 to 2018 from the World Development Indicator.

Table 2: Correlation Matrix

Variables	*lngdp*	*atm*	*cbb*	*dcp*	*lngcf*	*mos*	*inf*	*lnlab*
Lngdp	1.0000							
Atm	0.5591	.0000						
Cbb	0.5482	0.5341	1.0000					
Dcp	0.1190	0.4607	0.4507	1.0000				
Lngcf	0.0911	0.1829	-0.0915	0.3109	1.0000			
Mos	0.5268	0.3174	0.5994	0.4987	-0.0589	1.000		
Inf	-0.2438	-0.1304	-0.2756	-0.0846	-0.0158	0.249	.0000	
Lnlab	-0.2877	-0.0821	-0.1984	0.2905	0.3268	-0.015	0.115	1.000

Table 2 depicts the correlation among the variables used in the study. This result shows that the level of correlation among the variable is good as evidenced by the correlation values. There is no tendency of multicollinearity among the variables as evidenced by the correlation values which is in line with theory. The result shows that *Atm*, *CbbDcp*, *lngcf* and *Mos* are positively correlated to *lngdp*, while*inf* and *lnlab* are negatively correlated with *lngdp*., *CbbDcp*, *lngcf* and *Mos* are positively correlated with *Atm* while *Inf* and *lnlab*. Dcp and *Mos* are positively correlated with *Cbb* while *lngcf*, *inf* and *lnlab* are negatively correlated with *Cbb*. *lngcf*, *Mos* and *lnlab* are positively correlated with *Dcp* while *inf* is negatively correlated with *Dcp*. *Mos* and *Inf* are negatively correlated while *lnlab* is positively correlated with *lngcf*. *Inf* and *lnlab* are negatively correlated with *brm*.*lnlab*is positively with *inf*.

Table 3: Regression result

Variable	*One-step Result*	*Two-step Result*
$lngdp_{i,t-1}$	0.9740053* (0.0143946)	0.910121** (0.0396887)
$atm_{i,t}$	0.0001771***(0.0002841)	0.0003587** (0.0006592)
$cbb_{i,t}$	0.0000495 (0.0008856)	0.0004296 (0.0040286)
$dcp_{i,t}$	0.0005468* (0.0001247)	0.0006869* (0.0002301)
$lngcf_{i,t}$	0.0015401 (0.0010447)	0.0001719 (0.0017708)
$inf_{i,t}$	-.0005934***0.0003306)	-0.0006792** (0.0002929)
$lnlab_{i,t}$	-0.0228479** 0.0097315)	-0.0549377 (0.0460387)
$mos_{i,t}$	0.0004836* (0.0001141)	0.0006411* (0.0001798)
$\alpha_{i,t}$	0.2789741 (0.0097315)	0.3676026 (0.3249412)
Observation	238	238
Number of Countries	17	17
Number of instruments	323	300
Wald chi (2) p-value	(0.0000)	(0.0000)
AR (1) p-value	(0.0000)	(0.0000)
AR (2) p-value	(0.1980)	(0.3584)
Sargan test of overidentifying restrictions p-value	0.8411	0.3034

NB: The dependent variable is the GDP per capita, Variables GDP per capita, Gross Fixed Capital Formation and labour are in natural log.Standard errors in parentheses. *, ** and ***: significant at 1%, 5% and 10% respectively.

Table 3 shows the result using the system-GMM estimator. The two-step GMM estimation result is used for interpretation of result due to its superiority over the one-step GMM. The lagged value of the GDP is positive and statistically significant which means a unit increase in one period lag GDP increase the GDP by 0.910121. This means that there is persistence increase in the GDP per capita. The result also shows that Automated teller machines

(ATM) has a positive significant impact on economic growth which implies that a unit increase in ATM will increase the economic growth by one 0.0003587. Commercial bank branch has a positive insignificant impact on economic growth which implies that a unit increase in the commercial bank branch will increase economic growth by0.0004296. Domestic credit has a positive significant impact on economic growth which implies that a percentage increases in the domestic credit will leads to 0.0006869 percent increase in economic growth. Gross Capital Formation has a positive significant impact on economic growth which implies that a percentage increases in Gross Capital Formation will leads to 0.0001719 percent increase in economic growth. Inflation has a negative significant impact on economic growth which implies that a percentage increases in inflation leads to 0.0006792percent decrease in economic growth. Labour has a negative insignificant impact on economic growth which implies that a percentage increases in labour leads to 0.0549377 percent decrease in economic growth. Money Supply has a positive significant impact on economic growth which implies that a percentage increases in money supply leads to 0.0006411percent increase in economic growth.

The serial correlation tests$AR(1)$&$AR(2)$ and Sargan test indicate the instrument validity and reliability. The serial correlation test $AR(1)$ shows that there exists serial correlation at first order while the $AR(2)$ indicate no existence of serial correlation at second order which leads to the acceptance of the null hypothesis that error term of the differenced equation is not serially correlated at the second order $AR(2)$. The Sargan test of overidentifying restrictions result shows that all the instruments are exogenous which leads to the acceptance of the null hypothesis of overall exogeneity of the instruments used in the estimation.

5. Research Findings and Discussion

The discussion of the finding is based on the system-GMM result. The result indicated that ATM has a positive significant impact on economic growth, this result is in line with theoretical expectation and the findings of (Oseni, 2018) as well as the *apriori expectation* of the study. The GMM result shows that a unit increase in the number of ATM will lead to an increase in the rate of economic growth by 0.0003587. The number of ATM galleries in the selected African countries is very low compared to the economic advantage it has. Most commercial banks have one or two ATM galleries in their branches alone. They do not operate street banking where ATM galleries can be assessed by the grassroots. Most consider this to be too risky because of the level of insecurity in those countries. Commercial bank branch has a positive insignificant impact on economic growth which conforms to the *apriori expectation* of the study.

There is positive correlation between bank branches and ATM operations. This confirms the fact that ATM terminals are mostly found in the banking premises. Domestic credit has a positive significant impact on economic growth which is also in line with theoretical expectation and the prior study of (Qamruzzaman & Jianguo, 2017) as well as the *a priori expectation* of the study. Domestic credit should spur economic growth because in recent times, the involvement of agent banking operators in the provision of domestic credits has greatly assisted domestic credit disbursement. Gross Capital Formation is positively related to economic growth which is in line with the theoretical expectation, the *a priori expectation* and the prior work of (Qamruzzaman & Jianguo, 2017). Inflation is negatively related with economic growth which conforms with the theoretical expectation, the *a priori expectation* and the prior work of (Qamruzzaman & Jianguo, 2017). Labour is negatively related with economic growth which is contrary with the theoretical expectation, the *a priori expectation*. The negative sign of labour could be due to the low level of utilisation of labour which has increased the level of unemployment in the economy. Money supply is positively related to economic growth which is in line with with the theory, the *a priori expectation* and the prior work of (Qamruzzaman & Jianguo, 2017).

6. Conclusion

The study examined the impact of financial innovation on economic growth among selected African countries. Panel data for this study include seventeen (17) countries for fifteen (15) years which was obtained from the World Bank Development Indicator. This study carried out the paned estimation using the system-GMM estimation technique. The study found that financial innovation has significant impact on economic growth. It was also found that automated teller machine and domestic credit are the only financial innovation variables that has significant impact on economic growth. It is therefore recommended that the policy makers should encourage establishment of more

automated teller machines terminal which will contribute to the growth of the economy. Also, credit to private sector should also be encourage as this exert a huge contribution to the growth of every nation. However, the establishment of commercial bank branches was found to impact the economic growth positively but insignificantly. The insignificance of the commercial bank branches could be due to insufficient number of bank branches. The policy makers should therefore ensure that more commercial bank branches are establishes in order to cater for both rural and urban dweller. In a nutshell, this study therefore conclude that financial innovation has significant impact on economic growth in Africa .

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