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ICT, Economic Prosperity and Financial Development: New Evidence from Nigeria

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Abstract

The inquiry investigates the influence of Information Communication Technology (ICT) variable and economic progress on financial development in Nigeria. The Autoregressive Distributed Lag (ARDL) was used to estimate data series from 1886 - 2021. The results revealed that the technology variable (ICT) measured by integrating mobile phone subscriptions and internet usage has a positive and important influence on financial development (FD). Thus, technology arising from enhanced ICT variable is instrumental in stimulating FD. The consequence is that financial markets require the use of internet and mobile broadband to be effective. Equally, the results of the impact of mobile subscriptions and the internet by excluding the ICT variable revealed that mobile phone subscriptions and the use of the internet have positive effects on FD. Moreover, the results revealed that economic growth positively and significantly impacts financial development. This implies that an advanced level of economic growth stimulates FD. Additionally, FDI also influenced FD. Thus, an increase in FDI facilitates financial development. Nevertheless, human capital has an inverse impact on FD. Policy implications were also provided.

Keywords: *Technology, Economic Progress, Financial Development*

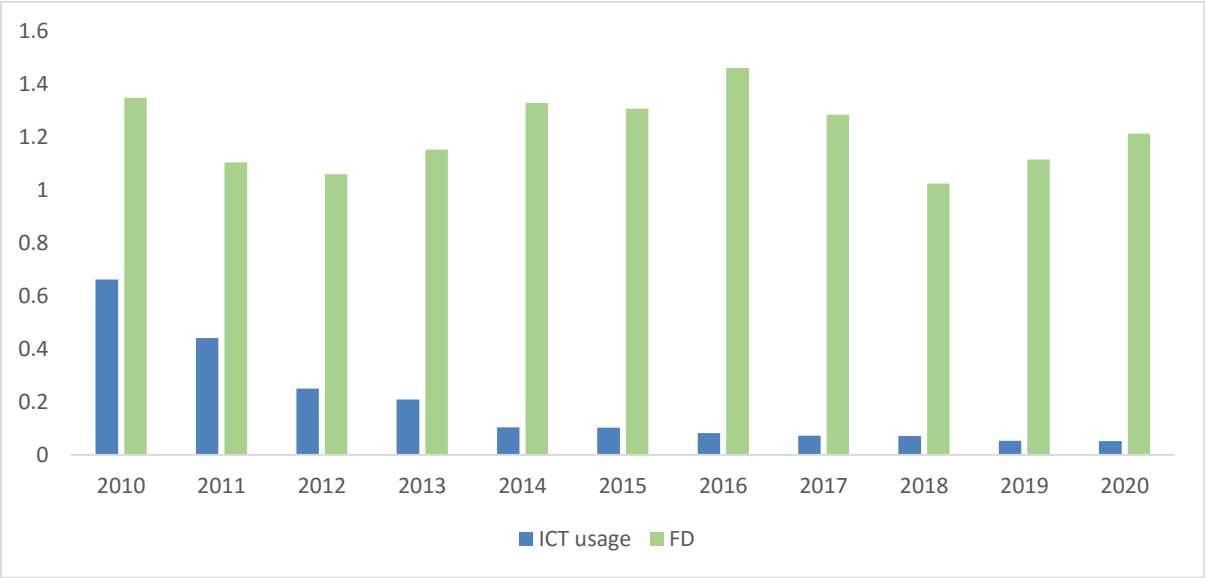
JEL Classification: 01, 02, 03, 04, G1, G2

1. Introduction

Digital technology such as information communication technology (ICT) has become more important in our daily lives. ICT facilitated smooth payment of bills, enhances digital banking, such as mobile transactions, and facilitates access to e-learning, online order of consumables and access to general information (Ofori et al., 2022). A recent development in this direction in Africa and Nigeria is the increasing link between financial development (FD), ICT access, its usage and ICT skills.

The financial institution of Nigeria has witness disruptive innovation in recent times from enhanced use of internet and mobile banking in financial transactions and the use Point of Sales Terminal (CBN, 2021). The improvement in the usage of mobile phones and internet for transactions witness a surge during the COVID-19 pandemic due to lockdown measures put in place by the Nigerian government. This has encouraged remote transactions from homes with the aid of internet and mobile phones. Since the pandemic period the use of internet and mobile facilities has continued to increase in financial transactions in Nigeria. Figure 1 presents the relationship between FD and ICT usage. Internet subscription is used to indicate ICT usage while average national credit to private organisation segment of gross domestic product (GDP) was used to indicate FD from 2010 – 2020. Compared to the ICT usage which is used to measure technology, the penetration of financial development in Nigeria is higher over the period under consideration.

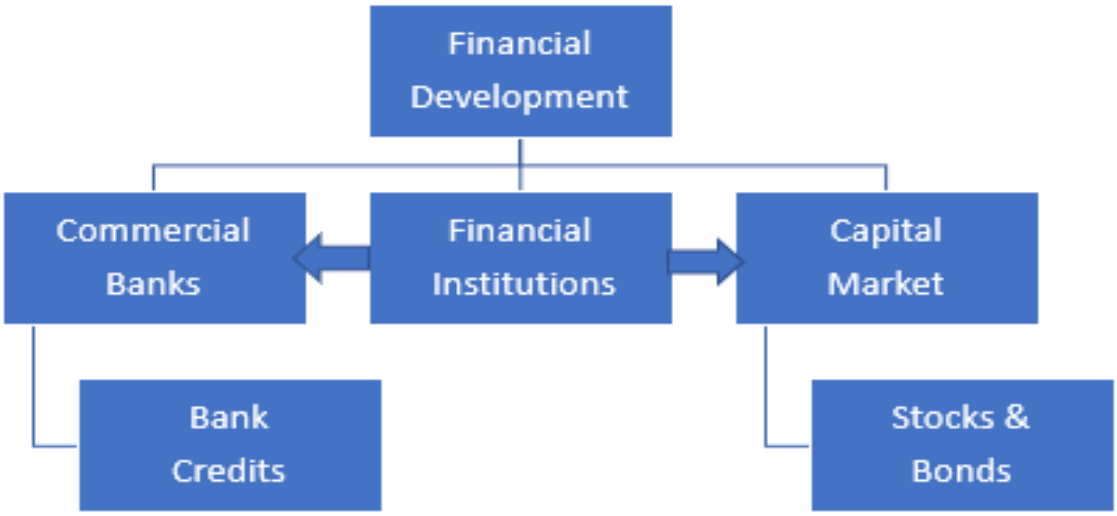
Figure 1: Average FD and ICT Usage in Nigeria, 2010-2020



Source: Author, using data from WDI

In spite of the acknowledged importance of financial development for economic progress, experts in the late 20th century highlighted that an excessive level of financial liberalization can have adverse effects on growth and development. They argued that an abundance of financial deepening may result in inflationary pressures, which could undermine the stability of the banking sector and potentially trigger a financial crisis (Islam et al., 2021). In Figure 2 it is evidenced that financial development emanates from the activities of financial institutions which include commercial Banks and stock markets. Commercial Banks can create asset by giving out credit or loans to households and firms while the stock market can be used to mop-up or increase liquidity in the economy through buying and selling financial securities respectively.

Figure 2: Financial Development Components



Source: IMF, 2015

According to Levine (1997), one of the main purposes of the financial system is to enable the efficient allocation of resources across time and space. It achieves this by performing essential functions such as resource allocation, mobilization of savings, facilitating trade and risk management, monitoring corporate control, and enabling the exchange of goods and services. These functions, mediated by financial market intermediaries, help reduce market inefficiencies by regulating information and transaction costs. Consequently, they have a significant impact on economic growth through the accumulation of capital and the promotion of technological innovation (Islam et al., 2021). This is in line with the endogenous growth models which contend that technological progress resulting from improvement in ICT research and development is among the internal factors that leads to economic growth. For instance, despite that Nigeria is lagging behind in technological progress, the technological improvement noticed in recent times has impacted positively in most economic activities (NBS, 2021; NCC, 2021) Therefore, technological progress resulting from improvement in ICT access, ICT usage and ICT skills in Nigeria has contribute to the recent improvement in economic activities in the post COVID-19 pandemic era. The utilization of internet and mobile broadband technology in Nigeria has had a beneficial influence on various sectors, including the financial sector, manufacturing sector, wholesale and retail sector, and transportation sector. The advancements in information and communication technology (ICT) have also contributed to Nigeria's recent economic growth rate of 2.5% according to the National Bureau of Statistics (NBS, 2022). Hence, this study aims to expand our understanding by examining the effects of ICT technology and foreign direct investment (FDI) on the development of the financial sector.

2. Review of Literature

The inclusion of ICT and FDI as an important variable that affect financial market and financial development has increasingly been discussed in the literature of economic prosperity in recent times. The use of ICT skills assists businesses to access social and economic information of the society there by assisting the businesses and firms to mitigate cost of production while increase the efficiency of productivity. Besides understanding the society need, the coming of ICT technology has further facilitated the interaction among companies and virous sector through digital networking that enable business to be carried out more efficiently. The efficiency of using the digital network also include reducing space and time constraint to facilitate financial development with the banking sector serving as intermediaries. The penetration of ICT has meaningfully improved in recent years, bringing about digital revolution by building up the infrastructure of ICT (Batool et al. 2023).

In the financial wing, the banking industry is one of the well-known sectors that use the ICT technology. The banking industry provide payments services through electronic system like the use of android phones and internet services to carry out electronic transaction between the banks or its representative and their customers (Alshubiri et al., 2019). ICT can be defined as a comprehensive set of technologies that encompass the gathering, organization, and distribution of information. This includes hardware, software, and internet networks that facilitate the efficient transmission and processing of data. The primary objective is to minimize business costs, mitigate risks, and improve the productivity of manufacturing goods and services, leading to overall economic growth and development (Rodríguez-Crespo and Martínez-Zarzoso, 2019). ICT plays a crucial role in enabling financial transactions and facilitating capital market financing in today's globalized world. An example of this is seen in the organized financial markets, such as stock markets in different countries, which heavily rely on ICT and digital technology to ensure precise and efficient operations. Hence, without the ICT facilities the financial market cannot be able to systematically key in to the globalization development of recent times

while other financial firms or businesses will not be able leave up to societal expectation (Alshubiri et al, 2019).

In their study, Mushtaq and Bruneau (2019) investigated the impact of ICT on poverty reduction, income inequality, and financial development. They analyzed data from 62 countries over a 12-year period, specifically examining microfinance institutions and commercial banks. The findings indicate a positive relationship between ICT penetration and financial development, a negative relationship between ICT and income inequality, and ultimately conclude that the adoption of ICT devices in the financial sector can contribute to economic prosperity by reducing poverty and income inequality.

According to Rodríguez-Crespo and Martínez-Zarzoso (2019) the world economy progress can be seen from two perspectives which are technological disruptive innovations and globalization. Out of these two elements of growth, ICT has demonstrated its importance by integrating economies through the use of internet and increasing flow of business among countries of the world. When ICT channels and products like internet and ICT gadget are used, the financial positioning of countries tend to improve which further enhances productivity of the economy. To add to the debate, Thanh-Ha (2022) assessed the influence of globalization on FD on a group of European countries. Several ICT measurements like the internet usage, e-governance and e-commerce were used along with several financial development measurements to ascertain the efficiency, access and depth of financial market of 27 European countries. The findings suggest that the use of ICT in commerce, government and other agencies played important role in promoting FD and the progress of financial market.

The emergence of ICT has led to the growth and expansion of global markets. This is achieved by improving the efficiency of communication, reducing cost and risk of transaction and enable some developing nation to transit from traditional approach of carrying out transaction to a more modern approach. ICT has been also conceived as the modern activity that facilitates the receipt, processing and storage of useful information vial electronic gadgets like mobile phones, internet, computers and other wireless signals (Lee et al., 2019). ICT facilitate the efficient running of services online and avails good data to financial market like the commercial banks, stock exchange markets and provident funds. ICT development has led to the growth of e-commerce in early decades that generated several opportunities that include online banking and the recent proliferation of financial technology (fintech). This ICT development has represented technological progress that has expand access to target customers, increase access to customers data and preferences, increase efficiency at a minimal cost and introduce variety of product to customers (Bhunia, 2011).

Afshan et al. (2021) conducted a study exploring the impact of ICT on the performance of stock markets in ten Asian economies. They utilized quantitative correlation methods and discovered that the development of ICT enhances the effectiveness of stock markets. Similarly, Lee et al. (2019) examined the influence of ICT on the transparency of stock exchanges using data from seventy-one countries. Their findings demonstrated that countries with advanced ICT technology have more efficient and transparent stock markets compared to those with limited ICT technology. Furthermore, Bhunia (2011) investigated the effects of ICT on the development of the Indian stock exchange market. The study revealed that ICT usage significantly influenced the financial market by facilitating stock trading and providing shareholders with easy access to share prices. Additionally, ICT was found to increase the number of stockbrokers in the market and enable real-time online visualization of market and company's shares information.

In line with the Nigerian perspective for year 2030, despite that the country is among the countries with high penetration in the region, in relation to other continents of the globe the Nigerian economic is lagging behind in terms of ICT development. Therefore, the government is committed to invest in ICT sector to enhance financial market development and overall economic prosperity. Equally, expanding the ICT networks of the nation will further improve security and attract companies to invest in the countries and thereby increasing the volume of trade and the foreign exchange earning of the nation. There is consensus among ICT experts that that its penetration helps in reducing cost of transaction, minimize transportation cost and reduce risk of doing business. ICT assist businesses and companies to enhance the value of their supply chain and operation (Mozayani and Moradhasel, 2019).

ICT development has equally assisted in reducing the stress of startup business in the financial sector by reducing the asymmetry of information needed to be successful in starting and growing a new business as most innovative business ideas are often constraint with financial challenges as a result of gaps in information. Thus, financial markets that have developed their ICT can facilitate innovative business ideas through reducing the cost of financing and reduce the challenges that new business startups might face. Therefore, in the era of globalization, financial development of countries in the developing world like Nigeria will not progress without an efficient structure for ICT infrastructure in place. This study investigates the role of technology as measured by access to ICT facilities, usage of the ICT facilities and ICT skills and that of economic progress on FD in Nigeria.

3. Methodology

In line with variables of the study which include financial development (FD), technology, FDI and economic growth, the model specification is as follows. The modified estimation technique is in line with the work of Anwar and Sun (2011) and Nguyen and Lee (2021). To investigate FD and economic prosperity Anwar & Sun (2011) used a production function to emphasis on the role of FD on economic progress. This study is different in these respects: (i) the study develops a model for FD with economic growth as control (ii) the study interacts two different indicators of technology such as mobile subscription and the internet. Hence, the model specification is specified in functional and econometric form in equations 1 & 2 respectively.

$$FD = f(MOB * INT, GDP, FDI, HC) \quad (1)$$

$$FD = \pi_0 + \pi_1 MOB * INT + \pi_2 GDP + \pi_3 FDI + \pi_4 HC + \mu) \quad (2)$$

Where $\mathrm{FD}, \mathrm{FDI}, \mathrm{MOB} * \mathrm{INT}, \mathrm{GDP}$ and HC stand for financial development, foreign direct investment, technology variables of ICT, economic progress and human capital. MOB stands for mobile phone subscriptions while INT stands for internet usage. Related studies (Osie & Kim, 2020; Athreye et al., 2021; Castellani et al., 2022) have also used interactive terms in their studies. However, interacting ICT measures in the investigation of technology, FD and economic performance is not common in existing studies. Hence this investigation contributes to knowledge. Equation 2 will be tested to reveal the effect of $\pi_1 - \pi_4$, on FD. π_0 is intercept while μ is the disturbance term. Hence, we envisage that the size of the elasticities will exceed zero in the presence of good technology.

The Autoregressive Distributed Lag (ARDL) estimation strategy of Pesaran et al. (2001) was used as the main estimation strategy. This is due to some of its advantages and benefits that include allowing the use of variable unit root tested at level and first difference; ability to estimate both the long run and short run result instantaneously; possessing good property for series of variables with small samples size among others (Pesaran et al., 2001).

4. Results and Discussions

The result presentation commences with descriptive statistics and correlation matrix. The outcome of the descriptive statistics is offered in Table 1. The result deliberates on the statistics that check normality of data distribution. The dependent variables considered in this study are financial development, while the independent variables are ICT variable measured by mobile phone subscription and internet, economic growth, FDI and human capital. In the descriptive statistics, foreign direct investment has lowest average and middle values; ICT variable has highest average and median values while other dependent and explanatory variables' mean and median values fall with these two extreme values.

Furthermore, in determining the range, the ICT variable possess the highest value while mobile subscriptions have the lowest value. The values of the standard deviation for all the variables revealed that deviation of the observation data is cluster around the mean value. Human capital exhibits lesser deviation from the average value while the ICT variable exhibits the highest deviation from the mean value. The statistics of Jarque-Bera and probability values show that the observation of variables is normally and independently distributed with most of the Jarque-Bera statistics greater than 2 while the probability values greater than 0.10.

Table 1: Descriptive Data

	Financial development	Foreign direct investment	Economic growth	Mobile phone x Internet	Mobile	Internet	Human capital
Mean	2.205	0.236	1.265	10.357	1.246	0.843	4.503
Median	2.131	0.3470	1.612	11.655	3.304	2.079	4.498
Maximum	2.975	1.7562	2.729	20.679	4.585	3.569	4.626
Minimum	1.598	-1.693	-2.797	-0.501	-4.732	-4.729	4.365
Std. Dev.	0.348	0.735	1.127	5.810	3.726	2.775	0.069
Skewness	0.238	-0.197	-1.880	-0.427	-0.665	-0.790	-0.001
Kurtosis	2.544	3.123	6.930	2.267	1.666	2.093	2.250
Jarque-Bera	0.633	0.255	38.219	1.322	4.288	3.462	0.748
Probability	0.728	0.879	0.000	0.516	0.117	0.177	0.687
Observations	35	36	31	25	29	25	32

The result of the correlation matrix is offered in table 2. Correlation in econometrics is a situation where two or more variables are strongly associated. Thus, in econometric analysis, it is required that variables that are considered for analysis should not be strongly correlated. Order wise there will be potential problem of multicollinearity where most independent variables will be correlated (Sulaiman et al., 2015). The correlation results reveal interesting outcomes in terms of magnitude and sign or direction of the variables. For example, there exists positive correlation between financial development and ICT variable, FDI and economic growth while human capital revealed a negative correlation. FDI has a direct correlation with economic progress and human capital and negative correlation with other variables. Economic growth has positive connection with mobile subscriptions and human capital and inversely related with ICT variable and internet. ICT variable is positively correlated with mobile subscriptions and internet and negatively correlated with human capital. Importantly, the absolute values of virtually all the correlation coefficients are less than 0.8 which is the rule of thumb that ensures that variables in an estimated model are not correlated (Maji and Wazir, 2020).

Table 2: Correlation matrix

	Financial development	Foreign direct investment	Economic growth	Mobile phone x Internet	Mobile	Internet	Human capital
Financial development	1						
Foreign direct investment	0.061	1					
Economic growth	0.070	0.522	1				
Mobile phone x Internet	0.086	-0.621	-0.604	1			
Mobile	0.662	-0.228	0.098	0.052	1		
Internet	0.660	-0.307	-0.028	0.158	0.984	1	
Human capital	-0.430	0.429	0.401	-0.749	-0.205	-0.236	1

Additionally, the unit root test outcomes are presented in table 3. The unit root test tries to ascertain the level of integration of variables. If the mean and variance of a variable are time-invariant then the variable can be said to be integrated and free of a unit root. In testing the unit root problem, the null hypothesis which states that data of a variable has no unit root is the desired result. As such, the alternative hypothesis which is the occurrence of a unit root is not a wanted outcome. This investigation used the ADF and PP to test the level of integration of the series. The reason for integrating the two methods is to ensure robustness of result. The outcome of the integration test in table 3 shows that all the variables are integrated as such are unit root free. For example, financial development is integrated at first difference, ICT variable is integrated at first difference, mobile phone subscriptions and internet are both integrated at level, FDI is integrated at both levels and first difference, economic growth is integrated at both levels and first difference, while human capital is integrated at first difference. In general, we obtained an integration at first difference and at level. If such combination of variable integrations is obtained, the Autoregressive Distributed Lag (ARDL) can be applied as suitable method of long-run estimation (Pesaran et al., 2001; Sulaiman et al., 2015).

Table 3: Unit Root Tests

Variables	ADF		PP	
	Level	1st Difference	Level	1st Difference
Financial development	-1.548 (0.497)	-5.442*** (0.000)	-1.4139 (0.564)	-8.286*** (0.000)
Foreign direct investment	-3.546** (0.012)	8.666*** (0.000)	-3.643*** ()0.009	-10.297*** (0.000)
Economic growth	-6.6266*** (0.000)	-2.857* (0.069)	6.495*** (0.000)	-8.669*** (0.000)
Mobile phone x Internet	-2.432 (0.146)	-5.280*** (0.000)	-1.862 (0.343)	-1.990 (0.288)
Mobile	-3.544** (0.016)	-2.485 (0.129)	-1.424*** (0.555)	-2.424 (0.144)
Internet	-2.362 (0.162)	-1.312 (0.604)	-3.322** (0.025)	-2.338 (0.169)
Human capital	-2.035 (0.270)	-2.683* (0.090)	-1.740 (0.401)	-3.882*** (0.006)

*, ** and *** represent level of significance at 10%, 5% and 1%. Mobile x Internet is the ICT variable values in parenthesis (.) are P-values.

The next step is to presents the result of the impact of technology variable (ICT) and economic prosperity on FD. Before presenting the main outcome, the cointegration link between the dependent variable FD and the independent series, technology variable, mobile subscriptions, internet, economic progress and human capital was carried out. The cointegration which tries to find out the equilibrium link among these variables was tested using the Pesaran et al. (2001) ARDL bound test. It is necessary to confirm that equilibrium association exists amongst the variables before estimating the main ARDL long-run results. The result of the ARDL cointegration outcome is contained in table 4. Besides model 1 which is the main model, we have further conducted a robustness test for the cointegration to ensure strength of the result using models (2-6).

Therefore, a null hypothesis representing absence of cointegration $\pi_i = 0$ was tested in contrast to the alternate hypothesis $\pi_i \neq 0$ of the occurrence of cointegration. The findings as presented in table 4 did not consent with the null hypothesis but accept the alternate hypothesis. The rule for determining cointegration is as follows: if the F-statistic is below the lower bound I(0), it indicates that there is no cointegration. If the F-statistic falls between the lower and upper bounds I(1), the results are inconclusive, but cointegration may still exist. However, if the F-statistic exceeds the upper bound critical value at a 5% significance level, it suggests the presence of cointegration. We establish the presence of cointegration when the F-statistics for each model exceed the upper bound critical values at the 5% significance level. It's important to note that our analysis follows the conventional significance level of 5%. Therefore, equilibrium link exists between FD and the explanatory variables. This is proven by the values of F-statistics 3.59 (model 1), 4.29 (model 2), 50. 02 (model 3), 4.77 (model 4) and 5.37 (model 6) that are greater than their upper bounds critical values at 5% significance level. The upper critical values are 3.49 (model 1), 3.76 (model 2), 3.7 (model 3), 3.67 (model 4) and 3.49 (model 6). Therefore, cointegration and long-run equilibrium connection exists between financial development and its explanatory variables. Hence, we can continue to calculate the long-run results.

Table 4: ARDL Cointegration and Bond Test

Bound test results					
			Level of Significance		
Model 1	F-statistics	Bound test critical values	10%	5%	1%
$FD = f(MOB\text{x}INT, GDP, FDI, HC)$	3.59	I (0)	2.2	2.56	3.29
		I (1)	3.09	3.49	4.37
Model 2					
$FD = f(MOB\text{x}INT, GDP, FDI)$	4.29	I (0)	2.37	2.79	3.65
		I (1)	3.2	3.67	4.66
Model 3					
$FD = f(MOB\text{x}INT, FDI, HC)$	50.02	I (0)	2.37	2.79	3.64
		I (1)	3.3	3.7	4.7
Model 4					
$FD = f(MOB\text{x}INT, GDP, HC)$	4.77	I (0)	2.37	2.79	3.65
		I (1)	3.2	3.67	4.66
Model 5					
$FD = f(MOB, GDP, FDI, HC)$	2.65	I (0)	2.2	2.56	3.29
		I (1)	3.09	3.49	4.37
Model 6					
$FD = f(INT, GDP, FDI, HC)$	5.37	I (0)	2.2	2.56	3.29
		I (1)	3.09	3.49	4.37

Table 5 presents the main result of the effect of technology variable of ICT on FD in Nigeria. The Table contains the long-run, short-run and the diagnostics results. Models 1-4 present the long-run results of ICT variable and exclude variables of mobile subscriptions and the internet while models 5 and 6 present the result of mobile subscriptions and internet respectively and exclude ICT variable. The wisdom of presenting the results in this format is to avoid the problem of multicollinearity.

The long-run results of ICT variable which measures technology in models 1-4 revealed a positive connection between FD and technology in Nigeria. The finding shows that if mobile phone subscription is integrated with the use of internet, FD will increase. Therefore, technology arising from improved ICT variables is important in stimulating financial development in Nigeria. This is justified by the statistically significant coefficients of ICT variable 0.011 and 0.042 of models 1 and 3 respectively. The interpretation of these coefficients is that an upsurge in ICT variable by 1% will increase in FD by a minimum of 0.01% and a maximum of 0.04%. This finding is intuitive as development in financial markets requires the use of internet and mobile communication to be efficient. Additionally, models 5 and 6 also present the long-run results of the impact of mobile subscriptions and internet by excluding ICT variables to avoid multicollinearity. The findings are consistent in that mobile phone subscriptions and the use of internet can facilitate the growth of financial development. Concisely, an increase in mobile phone subscriptions by 1% increase FD by 0.06% and an increase in internet usage growth FD by 0.07%.

Table 5: Technology Variable (ICT), Economic Growth and Financial Development

Variable	ARDL estimations					
	Dependent variable: Financial Development (FD)					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Long- run results						
Mobile x Internet	0.011**	0.024	0.042***	0.010	-	-
	(0.006)	(0.037)	(0.006)	(0.012)		
Mobile	-	-	-	-	0.062***	-
					(0.015)	
Internet	-	-	-	-	-	0.076***
						(0.016)
FDI	0.105**	0.534	0.349***	-	0.146	0.152*
	(0.035)	(0.455)	(0.019)		(0.086)	(0.078)
Economic growth	0.125**	-0.302	-	0.197**	-0.027	0.003
	(0.055)	(0.682)		(0.083)	(0.067)	(0.059)
Human capital	-3.290***	-	-0.551	-2.996***	-1.246*	1.341**
	(0.354)		(0.328)	(0.687)	(0.637)	(0.573)
Constant	16.949***	2.4136*	4.392**	15.537***	7.855**	8.284***
	(1.641)	(1.218)	(1.526)	(3.171)	(2.851)	(2.561)
Short-run results						
FD (-1)	0.609**	0.603**	0.456***	0.425	0.117	0.197
	(0.187)	(0.190)	(0.051)	(0.258)	(0.240)	(0.244)
Mobile x Internet	0.034**	0.072*	0.032**	0.028*	-	-
	(0.0108)	(0.035)	(0.007)	(0.015)		
Mobile	-	-	-	-	0.026	-
					(0.042)	
Internet	-	-	-	-	-	-0.005
						(0.061)
FDI	0.077	0.025	0.116***	-	0.052	0.068
	(0.043)	(0.092)	(0.012)		(0.069)	(0.069)
Economic growth	0.096**	0.204**	-	0.171**	0.055	0.0629
	(0.035)	(0.074)		(0.055)	(0.053)	(0.051)
Human capital	-4.247***	-	-2.029***	-3.657***	-2.961**	-2.728**

	(0.565)		(0.148)	(0.735)	(0.956)	(0.951)
ECT (-1)	-0.046***	-0.645**	-1.583***	-0.381***	-0.588**	-0.670**
	(0.346)	(0.175)	(0.065)	(0.041)	(0.233)	(0.242)
Serial correlation	2.392	1.816	0.989	1.930	0.241	0.591
LM test	[0.172]	[0.255]	[0.579]	[0.214]	[0.789]	[0.568]
Heteroscedasticity	0.561	0.476	0.322	0.802	1.346	1.040
test	[0.797]	[0.869]	[0.939]	[0.616]	[0.301]	[0.440]

*, ** and *** represent level of significance at 10%, 5% and 1%. Mobile x Internet is the technology variable of ICT. Values in parenthesis (.) are standard errors. Values in bracket [.] for serial correlation and heteroscedasticity are p-values. ECT (-1) is the coefficient of the error correction for estimated models.

Figure 3a: CUSUM Test

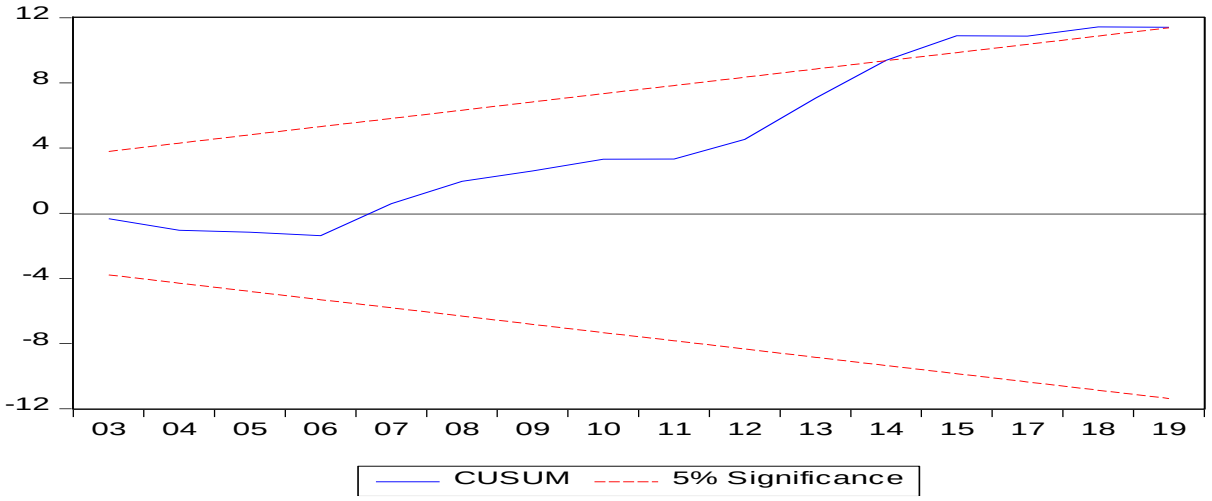
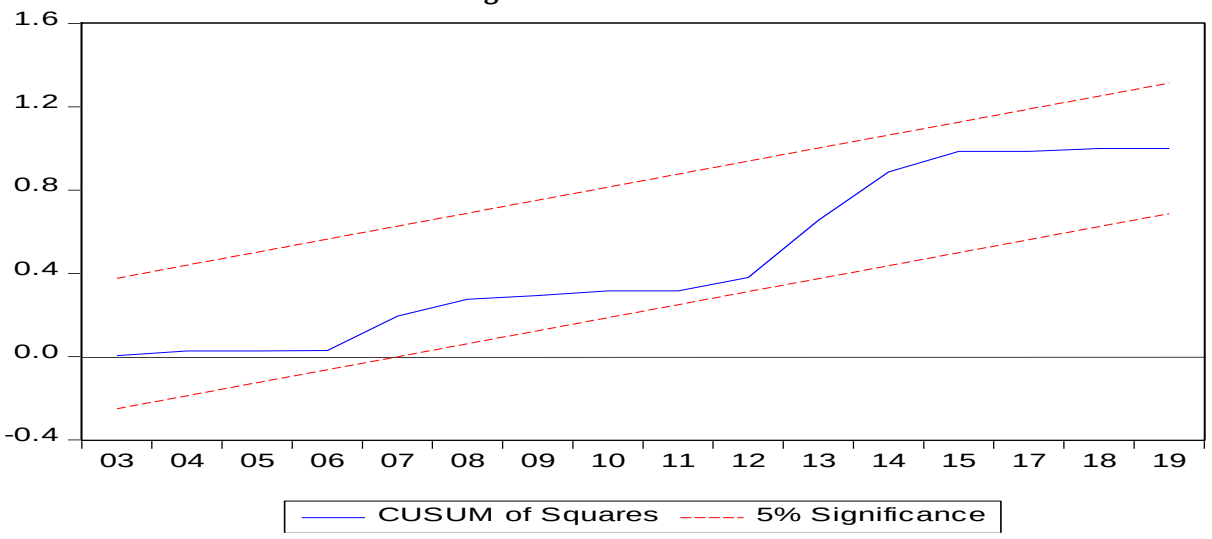


Figure 3b: CUSUM Test



Furthermore, the result of the impact of other explanatory variables: economic progress, FDI and human capital are also presented in Table 5. The result of the effect economic progress on FD is positive and significant as justified by the statistical significance of its coefficients of models 1 and 4. This infers that an advanced level of economic progress can stimulate financial development in Nigeria. The result shows that an increase in economic growth by 1% will facilitate an improvement in financial

development by up to 0.19%. Similarly, the results show that FDI impact positively on FD. Meaning that an increase in FDI facilitates financial development in Nigeria. Financial development will increase by maximum of 0.35% when FDI increases by 1%. This finding is also in agreement with economic theory that a causal relationship can run from FDI to financial development and vice versa. However, the result of the impact of human capital on financial development has consistently revealed a significant inverse relationship between human capital and FD. This suggests that the amount of human knowledge, training, skills and innovation required to stimulate financial development is not sufficient and thus the level of human capital is having an adverse effect on FD in Nigeria. This finding may not be surprising as there is large number of the country's workforce population that is unskilled or semi-skill.

Again, Table 5 also presents the short-run results of effect of ICT variable, economic progress, FDI and human capital on financial development. The findings are also consistent. ICT technology variables revealed a constructive effect on FD, economic progress and FDI also have a positive effect on FD as such, support the long-run results. Human capital in the short-run also has an adverse effect on FD. Moreover, lower part of the Table also presents diagnostic tests of the results. These include serial correlation test to ensure that error term in one period is not correlated with that of another period; and heteroscedasticity test which ensures the constancy of the error term. The diagnostic test shows that all the model 1-6 have passed both the serial correlation tests and the heteroscedasticity test. To strengthen the reliability of the results, a stability test has further been estimated employing test of CUSUM and CUSUM of squares in Figures 3a & 3b. The results show that the estimated model is within the acceptable bounds at 5% significance level as such, we can conclude that the estimated models are stable and reliable.

5. Conclusions and Policy Implications

The study investigates impact of ICT technology variable on financial development. The long-run results revealed a positive link between technology variable and FD. This suggests that when mobile phone subscriptions are integrated with the use of internet, the level of financial development will increase. Thus, technology arising from enhanced ICT variable is instrumental in stimulating financial development in Nigeria. This is informed by the statistically significant elasticity of ICT-financial development variables (0.011 and 0.042) in models 1 and 3. Hence, an increase in ICT technology variables by 1% will increase financial development by a maximum of 0.04%. This finding is not surprising since financial markets require the use of internet and mobile broadband to be effective. Equally, the long-run results of the impact of mobile subscriptions and internet by excluding the ICT variable revealed that mobile phone subscriptions and the use of internet have positive effect on financial development, as such, consistent with early findings. An upsurge in mobile phone subscriptions by 1% increase FD by 0.06% and an improvement in internet increase FD by 0.07%. The implication of this finding is that ICT is instrumental in financial development of any country as such policy makers should pay attention to the all recent development in the ICT sector of the economy.

Again, the outcomes shows that economic growth has positive and important impact on FD as justified by the statistical significance of its coefficients. This implies that an advancement in economic progress stimulates FD. A surge in economic progress by 1% will enable an improvement in financial development by up to 0.19%. Also, FDI positively impact FD. Meaning that increasing FDI facilitates FD. FD will surge by 0.35% when FDI increases by 1%. Nevertheless, human capital has adverse effect on FD. This is no unconnected with number of human capital knowledge levels, training, skills and innovation requirements to stimulate financial development in the country. Thus, we concluded that interactive technology variable of ICT improves FDI in Nigeria. The implication is that FDI, human resources and economic prosperity are strongly correlated as such policy makers must be attentive in controlling one of these variables in terms of the other.

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