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Contributionsof Teledensityon the Nigerian Economic Growth: Evidence from ARDL Bound Testing Model

TimnanBindapNdam[1]*, Azi Istifanus Madaki[1,2], Ikande Ezekiel Uwondo[1], and Puepet Nancy Naanzem[1]

[1]*Department of Economics, University of Jos, Jos, Plateau State, Nigeria*
[2]*Jinhe Centre for Economic Research (JCER), Xi'an Jiaotong University, China*

Abstract: Given Nigeria's persistent preference for telecommunications services and a rise in the number ofteledensity, the Nigerian economy remains beleaguered by low growth, low output from the manufacturing sector and high business costs. Therefore, it is against this context that this study used a dynamic ARDL bounds testing technique to examine the contributions of teledensity on economic growth in Nigeria, using the annual time series from 2000 to 2021 obtained from WDIs, NCC, NBS and CBN.The empirical evidence reveals the presence of co-integration between all the indicators. Results showed that the Telecommunication sector Revenue, Foreign Direct Investment, and Consumer Price Index positively impacted economic growth, while manufacturing output had a negative effect on economic growth in the short- run. The result further reveals that manufacturing output; Consumer Price Index, and Foreign Direct Investment positively influence the Nigerian economy, while Telecommunication Sector Revenue and Teledensity negatively influence the Nigerian economy in the Long- run. The study concluded that, in order to achieve high and sustainable growth in Nigeria, the government should formulate a policy that will encourage expansion of teledensity targeting the growth of the economy; foreign direct investment manufacturing sector and price stability should be formulated and implemented; such policy includes accessibility, affordability of mobile telephones and network services, a low tariff on all voice call and data usage and subsidies on importation of telecommunication equipment.

Keywords: Teledensity; Telecommunication; Consumer price index, Foreign Direct Investment and Economic growth.

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I. INTRODUCTION

One of the sectors that have attracted government attention in the world in recent years is the telecommunication industry (networks) and economic development,which were placed directly under their control and supervision.Efficient and Effective telecommunications *sine qua non* with economic growth and development:speedy national integration andbusiness transactions.Englama and Bamidele (2017) reported thatTeledensity was still grossly Minimal in the year 2000, quite different from the International TelecommunicationsUnion's (ITU) standard report. All countries that aspire to grow and develop; and to be part of the global village in today's world must make a conscious effort to develop their telecommunication sector. This is because the industry plays an important role in any country's social, economic and political growth.

The industrial telecommunication sector providesa variety of services in Nigeria most especially when it was deregulated in early 2000;such services include both private and publiccompanies in industries such as Telecom (Land and wireless communications), cable, satellite, internet service providers (ISPs), managed service businesses (utility companies), Television and Radio among others. The industry has ushered in a new era in Information andCommunication Technology (ICT). Cell phones, computers and the internet have rapidly changed communication habits, businesses and relationships among humans. The communication revolution has resulted in incredible cultural, psychological, technological and economic change in Nigeria since post-deregulation. Nigeria is rapidly gravitating toward a system of economy anchored oninformation availabilityubiquitously and continuously (Okon& Abel,2016). Recently,telecommunications advances in almost all governance sectorshave dominated the discussion in Nigeria. This is because it is an important vehicle in permitting information exchange to develop as a valuable good or service.

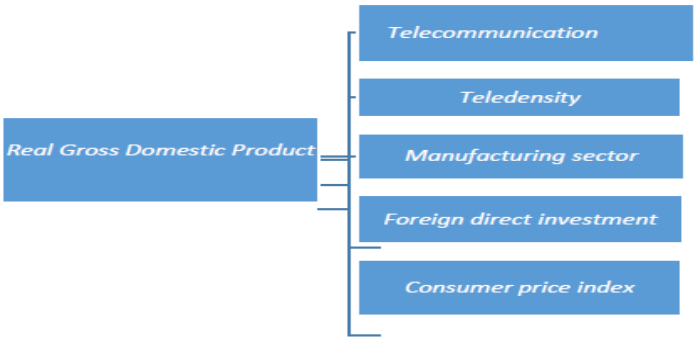
Today, the contributions of telecommunication industries in terms of Gross Domestic (GDP), unemployment level through varieties of Jobs opportunities, security and a platform for attracting Foreign Direct Investment (FDI) in Nigeriaare quite enormous. It is also important to categorically state that there is no direct relationship between telecommunication and Consumer Price Index (CPI). As conceptualized by James (2019),

CPI is used to determine the weighted average of prices of a basket of consumer goods and services, such asmedical care, accommodation, utility bills, transportation and food, among others. This is done by considering the price changes for each good or service in thepredetermined bundle of goods and averaging them. Changes in the CPI are used to determine the price changerelated to the cost of living; to identify the period of inflation or deflation, CPI is one of the most frequently used statistics in recent years. By and large, telecommunications in Nigeria, to an extent, plays a significant role in time-saving and minimizingthe cost of movement of goods and services such as transportation and distributions, thus, influencing predeterminedprices of a bundle of goods and services.

Since the deregulation of the sector in the early 2000 and several services offered by telecommunication in Nigeria, particularly the numbers of people using telephones, mobile or handset and internet services, the country still wallows in low economic growth, CPI, declined FDI, Telecommunication revenue and surge rate of unemployment among others. Therefore, the paper intends to examine the link between Teledensity and economic growth in Nigeria from 2000 -2021. The choice of the period is anchored on the fact that it was a golden era in the Global Systematic Mobile (GSM) businesses in Nigeria. Thefollowing hypotheses were set up; (i)Teledensityhas no significant impact on the economic growth of Nigeria (ii) There is a significant relationship between teledensity, consumerprice index, Telecommunication sector Revenue, Manufacturing output and foreign direct investment. The rest of the paper is organized as follows; part two is the review of selected literaturerelevant to the subject matter. Part three focuses on methodology, part four focuses on the result of data analysis and discussion, and part five deals with the conclusion and recommendations of the study.

II. LITERATURE REVIEW

2.1. **Conceptual Framework**



i. Telecommunication

This is conceptualized as the diffusion of organized information by different types or channels of technologies over electromagnetic systems such as Television, Radio, wire or optical device. It is also known as Telecom; which refers to the exchange of information over a significant distance by electronic means and refers to all types of voice notes, data and video transmission. This can be viewed in a broad term that includesa wide range of information-transmitting innovations or technologies and communications infrastructures, for example, wire phones; mobile devices, such as cellphones; microwave communications; fiber optics; satellites; radio and television broadcasting; the internet and telegraph among others.

Sajjad (2017)states that telecommunication is one of the most commonly used modes of global communication, stating that telecommunications have become a significant part of the global economy, increasing productivity and the rate of GDP per capita growth. Raman (2015) defines"Telecommunication occurs as the exchange of information between two entities with the use of technology." Communication technology uses channels to transmit information (aselectrical signals), either over a physical medium (such as signal cables) or in the form of electromagnetic waves.

Badran(2012), the telecom industry is a network of industrial broadband (or high-speed internet connectivity), a new technology widely used to access the internet worldwide. Telecommunications devices enable the diffusion of signals between two or more points of end users, allowing them to communicate and exchange data (Alugbuo& Eze, 2021, drawing from Wainaina, 2005). Telecommunications is the chief driver of economic progress in almost every economy. As with roads and railways, telecommunications is a type of infrastructure that attracts growth and development.

Teledensity

World Bank (2018) defined teledensity as the number of telephone connections per hundred people in a region. It is also described by Mamoun and Talib (2017)as the size of telephone lines per 1,000 people in a given

location. Sulaiman (2013) views it as the rate of growth of mobile phone users in a given space. Teledensity, otherwise known as penetration rate,as specified by Ani, Ugwunta, Eneje, and Okwo (2014) as the number of fixed-line and mobile phone subscribers per 100 persons. The total number of fixed landline telephone connections per 100 natives living in a specific geographical area. This definition applies to Nigeria's context as there is no particular area or house that does not use one or two telephones.In reinforcement of this fact, Wainaina (2012) noted thatteledensity is recognized as an index of telephone lines, indicating a country's telephone accessibility expressed in terms of the number of main lines per 100 residents.

2.1.3 Consumer Price Index

CPI is a comprehensive evaluation used to estimate price changes in the basket of goods and services representative of total consumption expenditure in an economy. Its measures the general price of goods and services in an economy (Osuagwu, 2012). Furthermore, the advantages of embracing technology include increasing the market and democratizingthe right of entry for consumers and producers alike. It is important to note here that since telecommunications and teledensity significantly expandthe economy's effectiveness and growth rate, their spillover effect on CPI is discernible to the entire economic agents (Government, producers and household).Onakoya, Tella, and Osoba (2012) added that technicalknow-how facilitates knowledge switch, storage, and retrieval among economic actors, industries, and sectors of the economy.

2.1.4.Foreign Direct Investment in Information Communication Technology

Alugbuo& Eze (2021) Foreign direct investment (FDI) refers to a venture made by an individual or corporate body in one country in the business interests, strictly undertaken by the citizen of another country. FDI in telecommunications has been a major contributor to Nigeria's rapid infrastructure growth in recent years.Transnational corporations have been involved in almost every aspect of the telecommunications industry's implementation (TNCs) in the last two decades since the sector deregulation in early 2000.

2.1.5. Manufacturing Output

According to the National Bureau of Statistics (NBS), the manufacturing sector in Nigeria is dominated by the production of agricultural products such as fruit, animals, beverages, and tobacco, with sugar and bread products accounting for themajority of output. Nigeria has not grown its technology to the level that it can begin to produce merchandised output.Nwakanma, Asiegbu, Eze, and Dibia (2014) view manufacturing production as the total of all factories in a country that produce goods. It is the industrial output of all facilities that produce goods in a country.

The Information Theory

The quantification, storage and communication of information define the information theory. In 1948, in a paper titled "A Mathematical Theory of Communication," Claude Shannon proposed data compression. This led to the discoveries such as compact discs, mobile phones, and the internet. Information theory, in summary, studies the transmission, processing, extraction, and utilization of information. This theory fits the activities of telecommunications networks, which could be described as a collection of transmitters, receivers, and communications channels that send messages to one another.

Telecommunications Enhanced Community (TEC) Theory

Telecommunications Enhanced Community (TEC) theory proposed by Wilde and Swatman (1997)attempts to combine many theories on communication theory, including Wellman's (1997) discussion of social interaction in a general computer network; Sproull and Faraj's (1997) discussion of computer-mediated social networks; and Romm and Clarke's (1995) theory of Virtual Communities and Society. According to the Telecommunications Enhanced Community (TEC) theory, a sufficient prerequisite for a community to remain successful is for its parts to be funded by a critical mass of activity within the framework of telecommunications network activities. According to Wilde and Swatman (1997), the development and diversity of computer networks have been truly amazing since the mid-1970s. Since computing and communication technologies converged, business and social networking applications have grown at an exponential velocity. The social computer network, which is constantly changing and expanding, has an effect on the entire industrial and population of human interaction. With a thrown population and economic rationalism, a community's adoption of electronic networking is a survival strategy for any economy that strives to develop. The aim of superimposing a network of electronic services on a traditional geographical group is to improve the general well-being of the economy.

However, the configurations of these networks vary according to the computer network or virtual community. Adoption is generally effective when it maintains existing users and attracts new ones by creating an appealing

lifestyle that combines physical and virtual services.This theory is linked to this topic because Nigeria needs to take advantage of the telecommunication industry to advance its economy.

2.3 EMPIRICAL LITERATURE

Several empirical studies conducted across the globe have provided disagreeing results regarding the connection between teledensity and economic growth, with no conformity on the precise effect of teledensity on Nigerian economic performance.

Alugbuo and Eze (2021) useda descriptive analysis with the help of the covariance correlation technique to scrutinize the economic effect of the telecommunication industry in Nigeria. Results showed that the percentage contribution of telecommunication to GDP, teledensity, and the Consumer Price Index positively influence the Nigerian economy more than foreign direct investment. The study recommended that to achieve high and sustainable growth, governments and telecommunication industry stakeholders should closely monitor the trend of telecommunication, teledensity, and economic growth to formulate and implement policies that will checkmate the downward trend that causes economic distortions in Nigeria.

Johnson, Olabisi, &Folake, (2021) examine telecommunication's impact on Nigeria's economic growth from 1998 to 2018. Classical least squares and fully modified ordinary least squares techniques co-integration and error correction model were used for the estimation. The result revealed that real investment in telecommunication, electricity, labor employed and stock of capital are statistically significant to economic growth in Nigeria's short-run symmetry.Positive economic growth is attainable when efficient and well-coordinated policies are implemented on labor productivity, price management, investment promotion and regular power supply was recommended.

Eke, Egwaikhide, Saheed, Alexander, Farouk & Adeleke (2019)investigate the impact of teledensity on economic growth in Nigeria between theperiods spanning from 1980 to 2018.The Autoregressive DistributedLag (ARDL) econometric technique and group statistic of correlation, correlogram, and maximumlikelihood technique were employed to analyze the time series data.The findings uncovered that estimation of error correction model (ECM),teledensity have positive and statistically significantimpacts on economic growth in Nigeria both in the short and long run.The policy was recommended to be geared towardthe accessibility and affordability of mobile telephone and networkservices.

Mamoun and Talib (2017) assess theimpact of investment in the infrastructure of the telecommunications sector on economic growth in Arab countries, using advanced econometric techniques, such as fully modified ordinary least squares,and panel data analysis utilizing cross-sectional data covering 12 countries and a period of 20 years 1996 – 2015. The study finds evidence that investment in infrastructure for the telecommunications sector has apositive and significant effect on economic growth in non-oil-producing countries in the longterm. Moreso, the findings show that telecommunication has no impact on the economic growth of oil-producingcountries.

Haider and Sharif, (2016) analyze the impact of teledensity on the economic growth of South Asiancountries from the period of 1994 to 2014. The GDP, which is the proxy of economic growth was ousted asa dependent variable, while predictors were gross fixed capital formation, labor force, and teledensity.The pooled regression methodology was employed. The study's findings reveal that all variables arepositive and significant in explaining economic growth and teledensity contributes more among allvariables.

Nwakanma,Asiegbu, Eze, and Dibia (2014) study the effect of the telecommunications industry onNigeria's economic growth, sample span (2001-2012).SPSS was used to evaluate the data obtained, and a regression model was estimated. The findings of the assessments, government expenditure, the number of telecom subscribers, and private investment all have a major effect on Nigeria's economic performance. This significant contribution was primarily due to the increase in telecom subscribers. The report, however, did not consider the effect of telecommunications' contribution to GDP on economic growth during the sample era.

3.1 RESEARCH METHODOLOGY

A research design is the plan and structure of examination conceived to obtain answers to research questions.The research utilizes a quantitative approach to empirically investigate the "Contributionsof Teledensity on Economic Growth in Nigeria."Real Gross Domestic Product is used as a proxy for Economic Growth in Nigeria. While the explanatory variables are Telecommunication Sector Revenue, Teledensity, Manufacturing Output, Foreign Direct Investment (FDI) and Consumer Price Index. Secondary data were employed to conduct this empirical research. The data were sourced from the National Bureau of Statistics (NBS), Central Bank of Nigeria (CBN), Statistical Bulletin, Nigeria Communication Commission (NCC), World Trade Organization (WTO) and World Bank Development Indicators.

3.2 MODEL SPECIFICATION

The conventional econometric methodology procedure specifies the mathematical and econometric models if a relationship exists among the variables under study (Gujarati, 2004). While the mathematical model assumes an exact relationship among economic variables, the statistical or econometric model modifies such relationship expressed in mathematical terms by introducing the error term. Since relationships among these variables in economics are hardly exact, using the disturbance term becomes necessary to capture the influence of other variables not represented in the model.The functional form of the model is expressed as

RGDP = f (TCRE, TEDE, MANU, FODI, CPIN) - - - - - (1)

The stochastic form of the model is as follows:

$RGDP = \boldsymbol{\beta}_0 + \boldsymbol{\beta}_1 TCRE + \boldsymbol{\beta}_2 TEDE + \boldsymbol{\beta}_3 MANU + \boldsymbol{\beta}_4 FODI + \boldsymbol{\beta}_5 CPIN + \mu$ - - (2)

Since the variables have different units of measurement with RGDP been that the inflation has been taken care of while Teledensity components measured in billions, equation 2 is transformed into a log-linear form as follows:

$LogRGDP = \boldsymbol{\beta}_0 + \boldsymbol{\beta}_1 LogTCRE + \boldsymbol{\beta}_2 LogTEDE + \boldsymbol{\beta}_3 LogMANU + \boldsymbol{\beta}_4 LogFODI + \boldsymbol{\beta}_5 TEDE + \mu$

Where:RGDP = Real Gross Domestic Product, TCRE= Telecommunication Sector Revenue, TEDE= Teledensity, MANU = Manufacturing Output, FODI= Foreign Direct Investment, CPIN = Consumer Price Index, μ= stochastic or Error Term or white noise, $\boldsymbol{\beta}_0$, = Constant or Intercept of the regression line, $\boldsymbol{\beta}_1$, $\boldsymbol{\beta}_2$, $\boldsymbol{\beta}_3$,$\boldsymbol{\beta}_4$, and $\boldsymbol{\beta}_5$= Coefficient of the parameter estimates of all the independent variables.

In an econometric form, the model will be expressed in Auto-Regressive Distribution Lag (ARDL) approach popularized by Pesaran, Shin, and Smith (2001). The ARDL bounds test technique has some econometric advantages over Engle-Granger (1987) andthe maximum likelihood-based approach proposed by Johansen and Juselius (1990) and Johansen's (1991)co-integration techniques. Firstly, the bounds test does not require pre-testing of the series to determinetheir order of integration since the test can be conducted regardless of whether the series are purely I(1),purely I(0), or mutually integrated. Second, the ARDL framework is relatively more efficient in the caseof small and finite samples. Third, we obtain unbiased estimates of the long-run model by applying theARDL methodology (Harris and Sollis, 2003).

The justification for the choice of ARDL was that it yields valid results regardless of whether the underlying variables are I(1) or I(0). More so, a distributed lag model is used to predict current values of dependent variable (RGDP) based on both the current values of explanatory variablesand the lagged (past period) values of the dependent variable. Thus, the ARDL model can be expressed as:

$$LogRGDP_t = \beta_0 + \sum_{i=1}^{p} logRGDP_{t-1} + \sum_{j=0}^{q} \beta_1 j logTCRE_{t-1} + \sum_{k=0}^{r} \beta_2 logTEDE_{t-1} + \sum_{l=0}^{s} \beta_3 logMANU_{t-1} + \sum_{m=0}^{t} \beta_4 logFODI_{t-1t} + \sum_{n=0}^{uu} \beta_4 logCPIN_t \quad - - - - - - - - (3)$$

Where:Log = Logarithm, $RGDP_t$ = Real Gross Domestic Product at time t, GDP_t = Real Gross Domestic Product at time t, $TCRE_t$ = Telecommunication Revenue at time t, $TEDE_t$ = Teledensityat time t, $MANU_t$ = Manufacturing Outputat time t, $CPIN_t$ = Consumer Price Index at time t,U_t = error term or white noise at time t, p,q,r,s,t and u= total number of estimated coefficients while i = 0, j=0,k=0,l=0,m=0, n=0, P=0 are the minimum sample size for which the model can be fitted.

3.2.1 The *A Priori* Expectation of the Model

The *a priori* expectations are the estimated parameters' signs and magnitudes. The *a priori* expectation of the coefficient of equation (iii) is as follows; $\beta_1 > 0$, $\beta_2 > 0$, β_3, β_4 and $\beta_5 > 0$, Koutsoiannis (1977), states that *a priori* definition is a theoretical criterion based on which the results of the estimation of the model are evaluated.

Table 1:
Expected Sign of Teledensity Components

Variable	Expected sign
TCRE	++++
TEDE	++++
MANU	++++
FODI	++++
CPIN	++++

Source: Authors Computation

4.1 RESULTS AND DISCUSSION OF MAJOR FINDINGS

Even thoughit has been argued that there may be no need to conduct a unit root or stationarity testwhen employing an ARDL estimation technique (see Abu, 2019),certain authors also advise the verification of the pre-testing of series to stay away from theinclusion of I(2) series in the analysis which tends to generate spurious regression result (seeSakanko& David, 2018; Abu, 2019). In essence, the Augmented Dickey-Fuller(ADF) and Philips-Perron (PP) techniques will be used to check the stationarity properties of theseries entering the model. These tests compare the null hypothesis of a series "has a unitroot" against the alternative hypothesis that the series "does not have a unit root."

Table 2:
Phillips-PerronUnit Root Test Result

Variable	Level	First Difference	I(d)	Conclusion
$lnRGDP_t$	-0.6139	-3.100870**	I(1)	Stationary
$lnTCRE_t$	-2.263759	-1.958088***	I(0)	Stationary
$lnMANU_t$	-3.700995	-3.277364***	I(0)	Stationary
$lnFODI_t$	-1.6923	-5.941091***	I(1)	Stationary
$lnTEDE_t$	-3.0937**	-6.249140***	I(1)	Stationary
$lnCPIN_t$	-1.960171	- 3.273966***	I(0)	Stationary

Note: ***, ** and * signify statistically significant at 1%, 5% and 10%, respectively.
Source: Authors Computation E-view 10

From the stationarity result presented in Table 2, it indicates that while ADF and P-P test
confirms that TCRE, MANUand CPINare stationary at levels, RGDP, FODIand TEDEwere made to be stationary after the first differencing. Nevertheless, the P-P test indicates that the series in themodel is a mixture of I(0) and I(1), which thus validates the use of the ARDL bounds testing Method to co-integration in the estimation of therelationship between the variables.

ARDL Bound Testing for Co-integration

The ARDL bound testing results in Table 3 show that the computed f-statistics of the five models estimated (61.01106) exceed the upper bound (i.e., 3, 3.38, 3.73 and 4.15) at 1, 2.5, 5 and 10 percent levels. Therefore, this confirms the existence of a co-integrating(long-run) relationship between the dimensions ofTeledensityand economic growth in Nigeria.

Table 3:
Results of Bound Test

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	61.01106	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Source: Authors Computation E-view 10

Discussion of Long-Run and Short-Run Models

Given that the bound testing result in Table 4 and ECM (-1.9) confirms the presence of a co-integrating (long-run)relationship between indicators and how fast the model will return to equilibrium after the exogenous shock, the ARDL model was estimated based on theAkaike Information Criterion (AIC) suggested optimal lag-lengths for all the variables considered in this study. The short-run and Long run results for the selected models are reported in Table 5.

The short-run result in Table 4 (Panel A) indicates that the two-period lag value of telecommunication sector revenue, Foreign Direct Investment, Consumer Price index and Teledensityhave a significant positiveeffect on economic growth in Nigeria. This is confirmed by the probabilities of less than 0.05%,while Manufacturing Output with two periodsof lagged values has a significant negativecontributionto economic growth in Nigeria. This indicates that RGDP increases by0.65%, 0.54%, 0.77% and 0.64% with a unit increase in TCRE, FODI,

CPIN and TEDE,respectively. Also, a 1% increase in MANU reduces economic growth by 0.43% in Nigeria within the period under review.

The long-run results reported in Table 4 (Panel B) reveal that Manufacturing Output became positive in the long run, Foreign Direct Investment and Consumer price index have a significant positive effect on economic growth in Nigeria. In essence, units increase in account of MANU, FODI and CPIN, economic growth will riseby4.1%, 93.8 and 8.0%,while Telecommunication sector Revenue and teledensity became negative in the long run. These also indicate that TCRE and TEDE have asignificant negative effect on economic growth at a 5% level. This implies that a percentincrease TCRE and TEDEreduces the percentage of economic growthby -9.35% and -18.44, respectively.

Table 4:
Results of the ARDL Model

Panel **A**: Short-Runs Coefficients
Selected Model: ARDL(2, 2, 2, 1, 2, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.873713	5.48E+12	0.000000	0.0000
D(RGDP(-1))	0.930785	0.224350	8.606125	0.0033
D(TCRE)	-0.102512	1.23E+11	0.000000	0.0000
D(TCRE(-1))	0.650939	7.83E+10	0.000000	0.0000
D(MANU)	0.296111	3.36E+10	0.000000	0.0000
D(MANU(-1))	-0.434011	4.68E+10	0.000000	0.0000
D(FODI)	0.542325	243.0937	2.476545	0.0895
D(CPIN)	0.829310	1.66E+10	0.000000	0.0000
D(CPIN(-1))	0.776109	9.18E+09	0.000000	0.0000
D(TEDE)	-0.251383	37198.03	-6.758056	0.0066
D(TEDE(-1))	0.642696	34882.04	4.709288	0.0181

Panel **B:** Long-Runs Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TCRE	-9.35E+11	8.01E+10	-11.66253	0.0014
MANU	4.10E+11	1.93E+10	21.24429	0.0002
FODI	93.88491	91.60025	10.24942	0.0020
CPIN	8.01E+10	1.05E+10	7.599871	0.0047
TEDE	-18.44401	32651.39	-5.648766	0.0110
C	4.17E+13	1.13E+12	36.85373	0.0000
CointEq(-1)*	-1.933614	0.054020	-35.79431	0.0000

Source: Authors Computation E-view 10

Results of Diagnostic Tests

Owing to the obvious issues associated with the use of time series data for estimation purposes, suchas the possibility of encountering problems of serial-correlation and heteroscedasticity, which tendsto invalidate or make unreliable any estimates generated, there is therefore need to examine thereliability of the estimated results in the model. For this purpose, diagnostic tests were conducted to test the reliability of the estimates.The diagnostics results reported in Table 5 indicate that the model for ARDL is void of the problems of serialcorrelation, heteroscedasticity, functional form, and normal distribution. This, therefore, entails thatthe estimated results are valid. In addition, the plot of the Cumulative Sum of Recursive Residuals(CUSUM) and Cumulative Sum of Squares of Recursive Residuals (CUSUMQ) lies withinthe 5% significant lines/red boundaries and also confirms the stability of the models.

Table 5:
Results of the Stability Test

LM Test	T-statistic	P-value
Normality (Jarque-BeraTest)	0.641198	0.725714
Heteroskedasticity (Breusch-Pagan-Godfrey Test)	1.3527	0.2611

Serial Correlation (Breusch-Godfrey Serial Correlation LM Test)	0.4652	0.6338
Functional Form (Ramey RESET Test)	1.971396	0.1875
CUSUM Test	2.311202	0.3149
CUSUM Test Square	22.6509	0.1132

Note: ***, ** and * signify statistically significant at 1%, 5% and 10%, respectively.
Source: Authors Computation E-view 10

5. CONCLUSION AND RECOMMENDATIONS

This paper examines the contributions ofTeledensity on economic growth in Nigeria, usingannual data from 2000 to 2021. Employing the ARDL bounds testing techniques, theempirical proof shows a significant co-integrating (long-run) relationship betweenthe components of Teledensity(Telecommunication Sector Revenue, Manufacturing Output, Foreign Direct Investment, Consumer Price Index and teledensity). The result demonstrates that, whileincreases in Telecommunication sector revenue, Foreign Direct Investment, Consumer Price Index and Teledensityin the short-run influence economic growth positively, Manufacturing Output was discovered to reduceeconomic growth in Nigeria in the Short-run.

In the longrun, the results indicate that Telecommunication Sector Revenue and Teledensity have significant negative contributions to Nigeria's economic growth, while Foreign Direct Investment, Manufacturing Output and Consumer Price Index werediscovered to have significant contributions to economic growth within the study period.

Based on these findings, this study recommended policy formulation that will encourage expansionof teledensity targeting the economy's growth;foreign direct investment manufacturing sector and price stability should be formulated and implemented in Nigeria. Such policy includesease of access, affordability of mobile telephones and network services, a low tariff on all voice call and datausage and subsidies on the importation of telecommunication equipment.

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