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INFORMATION AND TELECOMMUNICATION INFRASTRUCTURE AND ECONOMIC GROWTH: AN EXPERIENCE FROM NIGERIA

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Abstract

The study examines the effect of investment in telecommunication infrastructure on economic growth in Nigeria. Using time series data from 1980 and 2012, the study employs autoregressive distributed lag (ARDL) bounds testing approach proposed by Pesaran et al., (2001) to estimate the long run and short run effect of investment in telecommunication infrastructure on economic growth. The result from cointegration test showed presence of long run relationship between dependent and all explanatory variables. The study found foreign direct investment in information and communication technology more effective in improving and raising economic growth in Nigeria than government investment. The output from Chow breakpoint test shows that the liberalization of telecommunication industry introduced in 1992 has significant effect on economic growth in Nigeria. Therefore, it is imperative for Nigerian government to increase its spending on telecom and attract more foreign investment in telecommunication in order to boost productivity and economic growth.

Keywords: Autoregressive distributed lag model, growth, investment, telecommunication, FDI

1. INTRODUCTION

The role of infrastructure in the process of economic growth and development cannot be overemphasized. Infrastructure is one of the major factors that determine not only the growth of an economy but also the sustainability of such growth. For an economy to grow, some of its resources must be diverted from current consumption towards investment in infrastructural facilities. Infrastructure represents those capital stock that provides public goods and services. It has tremendous effects on production activities and quality of life for the households and the entire society (MacDonald, 2008).

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Information and Communication Technologies (ICT) represent those technologies people use to gather, distribute, share information and to communicate through computer and computer networks (ESCAP, 2000). They are those gadgets used for producing, distributing, processing, transforming information. They include telecoms, radio and television broadcasting, electronic media, hardware and software, and computer services (Marcelle, 2000). They involve the internet which is a worldwide network of computers and people using computers that make vast amounts of information available (Hargittai, 1999).

The growth in the Nigerian telecommunications landscape had recorded significant transformation in regulatory framework, coverage and investment since the introduction of Global Systems of Mobile Communications (GSM) networks. This was facilitated by the deregulation of the sector, which led to the introduction of major, namely Globacom, Mobile Telecommunication Network, Visafone-Mobile, and Etisalat. The telecommunication sector experienced sharp growth immediately after the deregulation process. As at December 2012, the sector had 418,166 connected fixed lines, 112,777,2785 mobile lines with combined subscriber strength of 113,195,951 lines leading to an increase of 18.1 percent over what it was in December, 2011. The teledensity also increase from 68.1 per 100 inhabitants in 2011 to 80.9 lines per 100 inhabitants in 2012 (CBN, 2012). However, despite the rapid growth in telecommunication infrastructure in Nigeria, the sector still faces a substantial market-efficiency gap in the mobile market (Foster & Pushak, 2011). In addition, the coverage of the mobile lines is not effective and efficient in the rural areas due to lack of electricity.

Although, an increasing number of macro and micro econometric studies between information and communication technology investment and various measures of economic performance have been carried out in developed and emerging countries (e.g., Brynjolfsson & Hitt 1996; Lehr & Lichtenberg, 1999), there is no appreciable studies that have empirically accounted for the link between ICTs growth in Nigeria. Most of the studies done on the impact of IT investment on economic performance in Nigeria are historical and descriptive in nature (see, Ogunsola & Aboyade, 2005, Nwachukwu, 2006). One major defect of most of these past works is that they paid little attention to the nature of the data being analysed. Implicit in their assumption was that the data being analysed were stationary.

Moreover, most studies in Nigeria focus only on government investment on telecommunication infrastructure without giving due consideration to foreign direct investment in telecommunication. Many studies of telecommunication-growth nexus in Nigeria do not consider time series properties of the variables used (see Posu, 2006; Osotimehin et al., 2010). In view of these inadequate studies on the impact of investment in telecommunication in Nigeria, proper polices cannot be made on the possible development of this sub-sector.

Thus, this study fills these gap by examining the effect of government and foreign investment in information and telecommunication on economic growth in Nigeria between 1980 and 2012.The Autoregressive Distributed Lag (ARDL) approach was used to obtained the long run and short run estimates of the relationship between investment in telecommunication and economic growth after ascertaining the

unit root properties of variables used.

The study is organized into five sections. Following this introduction, section two focuses on theoretical and empirical review. Section three details the methodology of the study. Section four presents data analysis and interpretation of result. Lastly, section five summarizes the findings, concludes the study and offers recommendations.

2. LITERATURE REVIEW

The role of information and telecommunications infrastructure in economic growth has been frequently emphasized both by practitioners and theorists. For example, telecommunication is seen as a means of fast acquisition and dissemination of information (World Bank, 2012). Rodriguez and Wilson (2000) consider ICTs as connection of activities which, through electronic means, facilitate the processing, transmission and distribution of information. Roller and Waverman (2001) argue that where the state of the telephone is rudimentary, communication between firms is limited. Besides, the transaction costs of gathering information and searching for services are high. And as the telephone system improves the costs of doing business fall and output will increase for individual firms in the economy.

There are empirical investigations that specifically looked at how information and telecommunications infrastructure affects economic growth in developed economies, taking into account the two-way causation between them. The literature on the subject investigates the feasibility of telecommunications as one of the causal factors of the economic development, and efforts to entangle the reverse causality between economic growth and the need for telecommunication services.

Various studies have also found varying degree of ICT's contribution to economic growth, especially with respect to developing and developed countries. These studies include Dewan and Kraemer (2000), which using data from 36 countries for the period 1987 to 1993, stated that IT capital is positively correlated with labor productivity in developed countries but not in the developing countries. Daveri (2001) used 18 OECD and European Union (EU) countries and data from 1992 to 1997 for his own study. He revealed that ICT's contribution to GDP growth in the 1990s for all countries studied was significant; however, the contribution in EU countries was lesser than in other industrialized countries. Madden et al. (1998) examined relationship between telecommunication infrastructure investment and economic growth for transitional countries of Central and Eastern Europe. They found a positive correlation between investment in telecommunications and economic growth.

Sridhar and Sridhar (2007) investigated the simultaneous relationship between telecommunications and the economic growth, using data for developing countries. Using three stage least square (3SLS), they estimated a system of equations that endogenize economic growth and telecommunication penetration, along with supply of telecommunication investment and growth in telecommunication penetration. They estimated this system of equations separately for main telephone lines and cell phones. They found that while traditional economic factors explain demand for main line phones, they do not explain demand for cell phones.

Zahra et al. (2008) empirically

investigated the dynamic relationship between telecommunication infrastructure and economic growth, utilizing information from twenty four low income, middle income and high income countries for a 18-year period, from 1985 to 2003. The results showed that telecommunication is both statistically significant and positively correlated to the real GDP per capita of those countries included in the study. The results are robust even after controlling for investment, population growth, past level of GDP per capita and lagged growth. Their results further showed that the telecommunication investment is subject to increasing returns, signifying, thereby, that countries gain more with the increase in telecommunication investment.

In Nigeria, the simultaneous relationship between telecommunications and the economic growth was investigated by Tella et al. (2007). They used a three-stage least squares econometric method for a system of equations that endogenise economic growth and telecoms penetration as well as telecoms investment. The study found that main landline and cell phone penetration had significant effects on economic growth at 5 per cent level.

A recent study on the effect of telecommunications infrastructure on economic growth in Nigeria was conducted by Osotimehin et al. (2010). The study appraised the effects of investments in telecommunication infrastructure on economic growth in Nigeria, measured by gross domestic product (GDP). Using pooled ordinary least squared (OLS) regression methods for national level data set in Nigeria for a sample period of 16 years (1992-2007), they found that telecommunications infrastructure measured by teledensity and telecommunications employment is both statistically significant at 1 per cent level and positively correlated with economic growth. The study concluded that the telecommunications infrastructure plays a role in determining growth and productivity in Nigeria.

Onakoya et al. (2012) investigated the impact of investment in telecommunications infrastructure on economic growth in Nigeria. Using a multivariate model of simultaneous equations and three-stage least squares method to capture the transmission channels through which telecommunications infrastructure promotes growth, Their result showed that telecommunications infrastructure investment had a significant impact on the output of the economy directly through its industrial output and indirectly through the output of other sectors.

Frederick et al. (2013) examined the impact of telecommunication expenditure on economic growth in Nigeria using time series data from 1970 to 2010. In conducting the analysis, the unit root tests and co-integration tests were estimated using the Augmented Dickey-Fuller technique. Their estimated results show that telecommunication, Foreign Direct Investment (FDI) and the degree of trade openness have a positive impact on economic growth in Nigeria while unemployment has a negative impact.

From the literature above, several inferences can be drawn. Firstly, findings on the role of information and telecommunication differs based on types of data used, time span and methodology adopted. Secondly, most studies, especially in Nigeria, focus only on government investment on telecommunication infrastructure without giving due consideration to foreign direct investment in telecommunication. Lastly, most studies of

telecommunication-grwoth nexus in Nigeria do not consider time series properties of the variables used. Thus, this study fills these gap by examining the effect of government and foreign investment in telecommunication on economic growth in Nigeria.

3. FOREIGN DIRECT POLICY IN TELECOMMUNICATION SECTOR IN NIGERIA

Currently in Nigeria, the government is gradually retreating from a public –sector-led growth strategy to a private -sector –led growth approach in the development of the economy. This has led to the liberalization of some major key sectors of the economy including telecommunication sector. The partial liberalization of telecommunication sector, in Nigeria, commenced in the year 1992. The deregulation of the sector ushered in the participation of the private sector comprising both domestic and foreign investors.

However, the foreign investors' participation has been immensely encouraged by the Nigerian government (NCC, 2003). The main reason for the encouragement is due to ever indiscriminate growth in the demand for the telephone services which the domestic investors were unable to satisfy as well as the high rate of business in modern communication facilities. Nigeria telecommunication has a lot of prospective business advantage that are yet to tapped. In fact, the country has become a fastest growing telecom market in the emerging markets economy in Africa.

Nevertheless, in spite this progress, the telecom industry in Nigeria has been daunted by an investment gap on its broadband development (Nwachukwu, 2013). This is an area that is peculiar for further development of the telecom industry in Nigeria. As a result the Nigerian Government is ready to partner with any foreign investor that deems it fit to proffer solution to the problem. In addition, a more favourable tax regime has been assured as a motivating factor for foreign investors in Nigeria.

The trend of FDI in the telecom industry has been increasing since the liberalization of industry. Table 1 shows that between 1980 and 1990, the average growth of FDI in the telecom industry average 12 percent. FDI inflows into the industry increased by more than 200 percent between 1992 and 1993 due to the liberalization of the industry. According to the past minister of Communications Technology, Dr. Omobola Johnson, between the period from 2007 till 2013, more than 50 percent of the FDI capital invested into Nigeria has been into the capital intensive resource sectors of which nearly 50 percent of FDI projects are service-oriented, and telecommunications has experienced particularly strong growth, attracting about 24 per cent of FDI projects (Okonji, 2014).

4. METHODOLOGY

4.1. Model

The transmission mechanism from information and communication technology to economic growth is an open question in the literature. The neoclassical growth model was employed to build a model that gives ICT a role in economic growth. The standard neoclassical growth model seeks to explain the growth rate of aggregate output from

various factors, such as labour, capital and technological progress also known as the Solow residual. The standard neoclassical model relating these factors to output is given as follows:

$$Y(t) = A(t)\, f\,[\, K(t), L(t)\,] \quad (1)$$

where $Y(t)$ represents output in time (t), $K(t)$ capital input in time (t) and $L(t)$ labor input in time (t). $A(t)$ denotes the technology level in the economy or its stock of knowledge and total factor productivity.

Given the significance of technological factors in economic growth, measures of information and telecommunication infrastructures were introduced into equation (1) to capture the effect of technological change on economic growth. According to Dewan et al. (2005), ICT infrastructures promote productivity and technological innovations. In this study, ICT infrastructures were proxied by foreign direct investment and government investment in telecommunication. The model is, therefore, specified as.

Thus:

$$Log(GDP_t) = \beta_0 + \beta_1 log(K_t) + \beta_2 log(L_t) + \beta_3 log(FDIT_t) + \beta_4 log(Gov_t) + \xi \quad (2)$$

where:

GDP= Gross Domestic Product,
K= capital,
L= labour force,
FDIT= Foreign Direct Investment in information and telecommunication,
Gov= government Investment in information and telecommunication.

Given the roles of exchange rate (EXR) and interest rate (INT) in the determination of the Nigerian economy, especially, during economic deregulation periods, these two variables were included in the above model to serve as control variables. Hence, the equation 2 becomes:

$$Log(GDP_t) = \beta_0 + \beta_1 log(K_t) + \beta_2 log(L_t) + \beta_3 log(FDIT_t) + \beta_4 log(Gov_t) + \beta_4 EXR + \beta_4 INT + \xi \quad (3)$$

Inclusion of exchange rate and interest rate in the equation 3 is further justified by the studies of Guetat and Drine (2009) and Obamuyi (2009). Obamuyi (2009) and Ikechukwu and Chigozie (2011), in their separate studies used interest rate as one of the facors influencing economic growth.

4.2. Sources and Measurement of Data

The study used secondary data. The data of interest are: Gross Domestic Product, gross capital formation, total government expenditure on communication, and foreign direct investment in information and telecommunication. All data, apart from labour force, were sourced from Central Bank of Nigeria (CBN) all statistical Bulletin (2012). Labour force was obtained from World Bank development indicator (2013).

Exchange rate was measured as naira per dollar rate. Exchange rate is important to growth in Nigeria given its volatile nature immediately after the Nigerian economic was deregulated. Interest rate was represented by change in lending rate. Interest rate has significant effects on economic growth through its roles in investment desicions (Obamuyi, 2009; Ikechukwu & Chigozie, 2011).

Government investment in telecom was captured by federal government total expenditure on information and telecommunication. Capital was proxied by gross domestic capital formation. Labour force comprises people aged 15 and older who are economically active population. It includes both the employed and the unemployed. Economic performance was proxied by Gross Domestic Product at 1990 contact factor cost. Lastly, FDI in information and telecommunication was measured as total inflows of foreign investments into telecommunication industry.

4.3. Estimation Technique

This study employs the technique ofAutoregressive distributed lag estimation technique (ARDL) to examine the effect of investment in ICT infrastructure on economic growth in Nigeria.The ARDL procedure can be used when the regressors are integrated of order zero or one unlike the strict requirement of Johansen approach which required all variables to be purely integrated of order one, that is, stationary at first difference (Fosu & Magnus, 2006). The ARDL procedure is also relatively more efficient in small or finite sample data sizes as is the case in this study (Kakar et al., 2010). The ARDL, however, is not efficient in the presence of variables that are stationary at second difference.

The ARDL cointegration procedure involves several stages. In the first stage, the stationary properties of time series variables were examined by implementing unit root test. The second stage involves testing for the existence of a long-run relationship dependent and independent variables within a univariate framework.The last and final step of an ARDL bound procedure is to obtain the short-run dynamic parameters by estimating an error correction model associated with the long-run estimates.

5. EMPIRICAL RESULT

In this section, the impact of information and communication infrastructure on economic growth is estimated using the Autoregressive Distributed lag model (ARDL) over the period 1980 to 2012. Before proceeding to the ARDL bounds test, unit root test of the time series variables used in this study were conducted and the result presented in Table 2. This was to ensure that the variables in our model are not I(2), that is, not stationary at second difference, so as to avoid spurious results. According to Ouattara (2004) in the presence of I(2) variables the computed F-statistics provided by ARDL procedure are not valid because the bounds test is based on the assumption that the variables are I(0) or I(1).

The ADF and PP unit root tests results for the variables are reported in Table 2. In the results, gross capital formation and labour force are stationary at level. That is, they are integrated of I(0) based on Phillip Perron test and Augmented Dickey Fuller test. All other variable- GDP, government investment in telecom, exchange rate, interest rate, and foreign investment in telecom are stationary only at first difference. The results show that the model in equation 2 consists of variables that are integrated of order zero and one. These results, thereby, justify the use of ARDL method.

Table 1. Trends of FDI in Telecomm

Year	FDI inflows into Telecom Industry	Percentage change in FDI inflows into Telecom Industry
1890	3620.1	2.456
1985	6804	6.009
1990	10436.1	-4.252
1991	12243.5	17.318
1992	20512.7	67.539
1993	66787	225.588
1994	70714.6	5.881
1995	119391.6	68.835
2000	157508.6	2.006
2005	324656.7	30.269
2010	576453.7	1.356

Notes: ** data for period between 1990 and 2000 were shown to emphasise the roles of liberation.

Table 2. Unit root tests

Variable	Augmented Dickey Fuller Test		Phillip Perron Test	
	Level	First difference	Level	First difference
LOG(GDP)	-3.340315	-5.087816**	-3.440315	-5.102278**
LOG(K)	-3.775140**	-3.777678**	-3.596300**	-3.571732**
LOG(L)	-3.673604**	-13.16627**	-4.650099**	-12.41712**
LOG(FDIT)	-1.263583	-4.424820**	-1.506547	-4.419699**
LOG(GOV)	-2.322979	-3.755195**	-1.478847	-3.755195**
EXR	-1.266169	-3.860309**	-1.177055	-4.939327**
INT	-2.388331	-5.436795**	-2.346592	-5.146119**

Notes: * * denote significance at 5%.

5.1. Bounds tests for cointegration

The results of bounds testing approach for co-integration long run relationship for equation 2 is presented in table 3. The calculated F-statistic of the model is statistically significant, implying that the null hypothesis of no co-integration cannot be accepted and, thus, it is concluded that there is indeed a co-integration relationship among the variables used.

Having found the existence of long run relationship between ICT infratructure, economic growth and other selected variables, the ARDL method was applied to estimate the long run parameters of equation 2. Table 4 presents the estimated long-run coefficients of equation 2. The lag length of long run model was selected on basis of Akaike Info Criteria (AIC). The R-squared and adjusted R squared of the model are about 0.99, signifying that about 99 percent of variations in economic growth is explained by all the included independent variables. The F-statistic value of the long-run model is also significant and implies that

Table 3. Cointegration test

Dependent var.	AIC lag	F-statistic	Prob.	Outcome
RGDP	1	4.82582	0.0000	There is cointegration

all the independents variables include in the model are jointly significant. The Durbin Watson test value, from Table 4, indicates an absence of serial autocorrelation. This further consolidates the appropriateness and reliability of results in Table 4.

The long-run result shows that capital formation, government and foreign direct investment in telecommunication infrastructure and exchange rate have significant positive effect on economic growth in Nigeria, while economic labour force and interest rate have an insignificant effect on economic growth in the long run. In the result, foreign direct investment in telecom has a significant positive effect on economic growth in Nigeria. The implication of this finding is that the Nigerian economy has been promoted by investment in telecommunication infrastructure. This is expected since investment in telecommunications networks can improve the productivity and efficiency of the economy and enhance the quality of life generally.

Also, the impact of government investment in telecom significantly promotes economic growth in Nigerian. This result implies that increased investment in telecom can boast long-term development. a percent increase in amount of government expenditure on communication will on the average leads to about 0.19 percent increases in economic growth in Nigeria.

The results of the short-run coefficients of the relationships between investment in ICT infrastructure and economic growth are given in Table 5. As in the long-run model, the lag length of short run model is selected on basis of Akaike Info Criteria (AIC).The signs of the short-run estimates are similar to that of long –run model, except that government investment has no significant impact on economic growth, while interest rate has a significant effect on economic growth.

In the result, there exist a positive and significant relationship between foreign investment in information and telecommunication technology and economic growth in Nigeriain the short-run. One percent increase in foreign investment in information and communication technology leads to about 0.077 percent increases in economic growth in Nigeria. The implication of this finding is that the foreign investment in information and telecommunication technology has the

Table 4. Estimated long run coefficients using the ARDL approach

Dependent variable: RGDP		
Independent variables	**Coefficient**	**T-ratio (prob.)**
LOG(RGDP(-1))	-0.016183	-0.623470
LOG(K(-1))	0.134352	6.610093
LOG(L(-1))	-0.180482	-1.399090
LOG(FDIT(-1))	0.061207	2.785611
LOG(GOV(-1))	0.195364	8.333907
LOG(EXR(-1))	-0.057390	-2.664548
LOG(INT(-1))	-0.004998	-0.103296
R^2	0.991178	
Adjusted R^2	0.988604	
F-statistics (P-value)	385.1952 (0.0000)	
DW	1.883589	

Table 5. Short run result for the selected ARDL model

Dependent variable: RGDP		
Independent variables	**Coefficient**	**T-ratio (prob.)**
LOG(RGDP(-1))	0.017657	0.916351
LOG(K(-1))	0.071881	2.173752
LOG(L(-1))	-0.046396	-0.579355
LOG(FDIT(-1))	0.077033	2.493034
LOG(GOV(-1))	0.037518	0.757795
LOG(EXR(-1))	0.004403	0.187294
LOG(INT(-1))	0.036655	3.165371
ECM(-1)	-0.544156	-2.218944
R^2	0.668185	
Adjusted R^2	0.538434	
F-statistics (P-value)	5.789480(0.0001)	
DW	1.823930	

potential of improving economic growth and development in Nigeria. ICT infrastructure affects economic growth through cost reduction, increase in productivity, increase employment, economies of scale and scope, income redistribution, location decisions of households and firms and agglomeration economies through the influence of the scale and spatial arrangement of public investment.This result is consistent with that the neoclassical theory of FDI, The theory claims that FDI promotes growth and development through the transfer of technology, managerial and marketing skills, market information, organizational experience, and the training of workers (Todaro & Smith, 2003).

In the result, there exist an insignificant positive relationship between government investment in information and telecommunication technology and economic growth in Nigeria. One percent increase in government investment in information and telecommunication technology leads to about 0.037 percent increases in Gross Domestic product (a measure of economic growth) in Nigeria. The implication of this finding is that government investment in ICT is not a significant promoter of economic growth in Nigeria. The insignificance of the effect of government expenditure of telecomm in the short-run, unlike in the long run, is as expected since execution of investment in telecom takes long time and so the return of and subsequent effect of investment on economic performance of developing countries such Nigeria, which have deficient infrastructures that could complement investment in Telecom. For instance, government in Nigeria have been investing in telecom since 1960, however, the real effect of these investment were felt in early 21st century when GSM was introduced and adequate policies – liberalization, and institution (regulatory body) were put in place. This result conforms with that of Pohjola (2000) and Ilegbinosa et al. (2015).

In addition, gross capital formation and interest rate have a positive impact on economic growth in Nigeria in the short run. One percent increase in gross capital formation and interest rate leads to about 0.071 and 0.036 percent increase in GDP respectively. However, labour force and exchange rate have an insignificant positive

short run effect on economic growth in Nigeria.

The result shows that the coefficient of ECM is -0.54 and significant at 5% per cent critical level. This shows that about 54 percent disequilibria in the economic growth in the previous year are corrected for in the current year. The significance of the ECM is an indication and a confirmation of the existence of a long run equilibrium relationship between economic growth and the measure of information and communication technology used in this study.

Also, the coefficient of determination (R-squared) of the model is 0.69, indicating the about 69 percent of the variations in economic growth is explained by variations in all the independent variables. The F-statistic value of the long-run model is also significant and implies that all the independents variables include in the model are jointly significant. Lastly, the value of Durbin Watson test (1.823), just as in the long run result, shows an absence of autocorrelation.

5.2. Structural Stability Test

In order to test whether or not liberalization telecommunincation industry has had significant effect on economic growth, the Chow breakpoint test was conducted. In our analysis, we identified two key dates at which the relationship between our variables could have started to change. The first one is in 1992 when liberation policy was introduced in the Nigerian telecommunication industry. The second is 1999 when democracy was ushered into Nigeria. Table 6 presents the Chow test results for the two dates, 1992 and 1999. The output shows that for both dates, the p-value reported for the Chow test statistic is less than 0.05. Hence, we can reject the null hypothesis of no breaks at specified breakpoints and we conclude that both the implementation of liberalization policy in the telecommunication industry and democratic governance had a significant impact on economic growth in Nigeria.

Lastly, since one major requirement of Chow breakpoint test that subsample periods must be equal is not satisfied, we used the Chow forecast test to test for structural change stating from 1992. The result of the test reject the null hypothesis of no structural change. Therefore, it is concluded the liberalization of the telecommunication industry has significant impact on economic growth in Nigeria.

6. CONCLUSION

The study examines the effect of investment in telecommunication

Table 6. Stability test

Chow Breakpoint Test: 1992			
F-statistic	3.186810	Probability	0.037022
Log likelihood ratio	37.20655	Probability	0.000024
Chow Breakpoint Test: 1999			
F-statistic	4.466801	Probability	0.020536
Log likelihood ratio	22.86671	Probability	0.006503
Chow Forecast Test: Forecast from 1992 to 2010			
F-statistic	176.0109	Probability	0.059296
Log likelihood ratio	235.3432	Probability	0.000000

infrastructure on economic growth in Nigeria between 1980 and 2012. From our findings, it can be reasonably concluded that the investment in telecommunication has improved and significantly impact economic growth in Nigeria.

The study found foreign direct investment in information and communication technology more effectivein improving and raising economic growth in Nigeria than government investment in information and communication technology. This finding lend support to the neoclassical theory that claims that FDI replaces the inferior production technology in developing countries by a superior one from advanced industrialized countries through the transfer of technology, managerial and marketing skills, market information, organizational experience, and the training of workers (Todaro & Smith, 2003).

Since investment in IT infrastructures play a vital role in economic growth, it becomes necessary for the Nigerian government to encourage the increase its spending on IT in order to boost productivity and growth. Adequate government investment in telecom infrastructures and technology will facilitate and improve capacity building of industries in the country. Government investment in ICT projects must include the local communities. It should be in technologies that people in the society can easily adapt to. It is also essential for governments to provide the incentives that attract more foreign investment in telecommunication. Priority should also be given to policies that encourage competition in the telecom industry.

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УТИЦАЈ РАЗВОЈА ИНФОРМАЦИОНЕ И КОМУНИКАЦИОНЕ ИНФРАСТРУКТУРЕ НА ЕКОНОМСКИ РАСТ: ИСКУСТВА ИЗ НИГЕРИЈЕ

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Извод

Ова студија проучава ефекат инвестиције у телекоминикациону инфраструктуру на економски раст у Нигерији. Употребом података временских серија у периоду 1980 до 2012, студија предлаже ауторегресивни дистрибутивни распон (АРДЛ) за тестирање граничних вредности, који су предложили *Pesaran* и сарадници (2001). наведена метода је коришћена како би се истражили дугорочни и краткорочни ефекти инвестиција у телекомуникациону инфраструктуру на економски рест. Резултати коинтеграционог теста показали су постојање дугорочних односа између зависних и свих експланаторних промењивих. Студија је показала да су страна директна улагања у информационе и комуникационе технологије значајно ефектнијег утицаја на пораст и јачање економског раста у Нигерији, него инвестиције државе. Резултати "Chow"- овог теста преломне тачке показују да је либерализација телекоминикационе индустрије, која је уведене 1992, имала значајан ефекат на економски раст у Нигерији. На тај начин, императив владе Нигерија би морао бити у порасту инвестиција у телекоминикације као и у привлачењу нових страних инвестиција у овом сектору, како би се унапредила продуктивност и економски раст.

Кључне речи: Ауторегресивни модел дистрибутивног распона, раст, инвестиције, телекомуникације,ФДИ

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