Institutions, Infrastructure and Economic Growth in Nigeria.

Ishola Rufus Akintoye
Department of Accounting
Babcock University, Ilishan-Remo, Ogun State, Nigeria &
Global Initiative Centre for Scientific Research and Development, Ibadan, Nigeria.
irakintoye@yahoo.com

&

Olalekan Bashir Aworinde[1]
Department of Economics,
Tai Solarin University of Education, Ijebu-Ode, Ogun State, Nigeria &
Global Initiative Centre for Scientific Research and Development, Ibadan, Nigeria.

aworindeob@tasued.edu.ng

Abstract

The study examines the impact of institutions and infrastructures on economic growth in Nigeria.We contribute to the infrastructure-growth nexus literature in Nigeria by accounting for institutions into the model. The justification for the inclusion of the variable is based on the fact that good institutions will induce growth and that it will serve as an impetus for investor to invest in Nigeria. The result shows that there is long-run cointegrating relationship using the bounds-testing approach of Pesaran et al (2001). The study shows that population and institutions contributes positively to growth and that public infrastructure has a negative significant impact on growth. It is strongly recommended that that government should monitor her public infrastructure spending by reducing wastages so that it can contribute positively to growth. In addition, government should adhere to good institutions so as to increase the inflow of foreign direct investment into Nigeria.

Keywords: Institutions, Economic growth, Infrastructure, Nigeria.

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[1] Corresponding author

1. Introduction

The centrality of public expenditure, particularly on infrastructure as an important instrument in the development process has long been acknowledged by policy makers. Public expenditure has remained a crucial issue in economic development, most especially in the developing countries, characterized by poor infrastructural service delivery, declining productivity, high level corruption and policy instability.

The poor infrastructure in almost all the developing countries has led to continued interest at investigating whether public expenditure on infrastructure has yielded significant results over time. In Nigeria for instance, the deplorable state of most infrastructural facilities and the state of disrepair and lack of maintenance culture especially in electricity, roads, railways, and water facilities as experienced by Nigerians affect the living standard of the populace, which lowers their productivity and ultimately economic growth in the country. Since infrastructure provide social comfort to the citizens, infrastructural deficit thereby worsen workers condition thereby lowering their productivity.

Electricity infrastructure has been in a state of comatose over the years and this has affected the citizens physically and psychologically thereby affecting economic growth. Massive interruption in the power sector usually disrupts ongoing business activities thereby impeding growth. Another problematic channel through which poor infrastructure impede economic growth is through transportation. Poor road network, underdeveloped rail lines, oligopolistic airline market have hindered the transportation of goods around the country.

Also is the decay of health infrastructure in the country. Health infrastructure deficits ultimately lead to huge capital flight in the sector since the rich seek better healthcare in advanced economy thereby expending what should have been retain in the economy. Apart from this channel, another channel through which health infrastructure deficit hamper economic growth is through the status of the labour force. An healthy population is an active population and since most workers are not insured, their health is compromised and this ultimately hinder productivity in the economy.

Against this background, it is evident that infrastructural development is paramount in transforming the economy, thus good institutions could also help in contributing to growth. The kernel of this paper is to examine the impact of institutions on infrastructures and economic growth in Nigeria. The remainder of the paper is organized as follows. Section 2 provides the

theoretical linkages and the empirical evidence on infrastructure and economic growth. Section 3 provides the methodology of the study. Section 4 is devoted to empirical results. Section 5 concludes.

2. Theory and Evidence

The transmission mechanisms of infrastructure to growth are abundant in the economic growth literatures. The first transmission mechanism is given by Aschauer (1989) and Barro (1990). They opined that investments in public infrastructure enhance private sector productivity. They argued that increase in public capital stocks has a positive but decreasing impact on the marginal product of all factor inputs. Thus, the cost of production inputs falls and the level of private production increases.

The second and the third transmission mechanisms is given by Agenor and Moreno-Dodson (2006) and they are the complementarity and crowding out effects. The complementary channel promotes growth through private capital formation. That is, public infrastructure raises the marginal productivity of private inputs, thereby raising the perceived rate of return on private capital and possibly also increasing private sector demand for physical capital. The crowding out channel, argued that an increase in public capital stocks may displace or crowd out private investment. This negative crowding out effect of infrastructure may turn into a long-term negative effect if the decrease in private capital formation persists over time.

The fourth channel is suggested by Estache and Fay (2009), who argued that investment in public infrastructure can also impact investment adjustment costs, the durability of private capital, and both the demand for and supply of health and education services.

In addition, Agenor and Moreno-Dodson (2006) add labour productivity as another channel whereby public infrastructure indirectly increases growth. They opined that good access to infrastructural facilities means that workers can get to their jobs more easily and perform their job-related tasks more rapidly. Studies by Fourie (2006); Fedderke et al. (2006) and Richaud et al. 1999 also found evidence of various positive externalities induced by public infrastructure, including increased competitiveness, greater regional and international trade, expanded FDI, and finally higher profitability of domestic and foreign investment flows which raises investment ratios and boosts growth in per capita income.

There are abundance of empirical literature on public infrastructure and growth in the world over. However, the results are mixed and inconclusive owing to different data sets and econometrics techniques employed. Few among the studies that found positive effects on infrastructure on growth are; Sanchez-Robles (1998), Aigbokhan (1999), Rioja (2001), Romp and de Haan (2005), Fedderke and Bogetic (2006), Bose et al. (2007), Estache and Fay (2009), Sahoo and Dash (2009), Ijaiya and Akanbi (2009), Foster (2009), Calderón (2009), Akinlabi et al. (2011), Dissou and Didic (2011), Onakoya et al (2012) and Fasoranti (2012).

Sanchez-Robles (1998) analyzed the infrastructure growth relationship for a panel of countries for the period 1950-1992. Using the quantity of public infrastructure stock rather than public infrastructure expenditures and found a positive and significant relationship. In addition, Aigbokhan (1999) study on infrastructure, private investment and economic growth in Nigeria find evidence to support that infrastructure have positive correlation with growth. Rioja (2001), using computable general equilibrium model for Brazil, Mexico and Peru, show that the countries underinvested in infrastructure during 1970s and 1980s. The simulations suggest that infrastructure can positively impact output, private investment and welfare.

Furthermore, Romp and de Haan (2005), finds that 32 of 39 studies on OECD countries find a positive effect of infrastructure on some combination of output, efficiency, productivity, private investment, and employment. Fedderke and Bogetic (2006) also examine the impact of infrastructure investments in South Africa. They observed that past studies have shown the effect of public infrastructure investment on economic growth to be ambiguous. They contend that this result is due to not controlling the endogeneity of infrastructure investment. When they control the endogeneity of infrastructure investment, their findings is that infrastructure investment has a positive effect on economic growth and development. Bose et al. (2007) find that government capital expenditures as a share of GDP are positively and significantly related to per capita income growth across a panel of 30 developing countries over the 1970–1980 periods. However, current expenditures are shown to have an insignificant effect on growth in these countries over this timeframe.

Estache and Fay (2009) study on developing countries shows that 9 of 12 countries indicate a positive significant impact between infrastructure and growth. Sahoo and Dash (2009) also show for India that the stock of infrastructure positively contributes to growth with unidirectional causality from infrastructure development to output growth. Ijaiya and Akanbi (2009) found long

term positive linkages between infrastructure and economic growth for Nigeria. Similarly, Foster (2009) established a positive and significant relationship between infrastructure and growth in South Africa, Nigeria, Uganda and others. Calderón (2009) examines the impact of infrastructure development on economic growth in 136 African countries for the period 1960–2005, it evaluates the impact of a faster accumulation of infrastructure stocks and an enhancement in the quality of infrastructure services on economic growth across African countries over the sample period. The study findings indicate that growth is positively affected by the volume of infrastructure stocks and the quality of infrastructure services.

Akinlabi et al. (2011) examine the impact of investment in public infrastructures on poverty alleviation and consequently economic development in Nigeria. Using Cointegration and Granger causality test for the period 1981 to 2006, they found public infrastructure Granger cause GDP, but fiscal deficit does not Granger cause GDP. Dissou and Didic (2011) found for Benin that the crowding out effects of public infrastructure is sensitive to the mode of financing chosen by the government. Overall, their findings suggest that public investment in infrastructure can support private investment and sustain capital accumulation. The positive impact of public investment on private investment can be explained through the infrastructure financing channels such as public private partnerships and sub-contracting which in turn tend to crowd-in private investment.

Onakoya et al (2012) investigate the impact of infrastructure on economic growth in Nigeria. Using three-stage least squares, result shows that infrastructural investment has a significant impact on output of the economy directly through its industrial output and indirectly through the output of other sectors such as manufacturing, oil and other services. The agricultural sector is however not affected by infrastructure. Fasoranti (2012) examined the effects of disaggregated government expenditures on infrastructure on the growth of the Nigerian economy. Results showed a long run relationship between the growth of the economy and government expenditures in education, environment and housing, health services, water resources, inflation rate, agriculture, security, transport and communication.

In contrast, studies showing a negative relationship between infrastructure and economic growth include; Landau (1986) and Barro (1991) who found that government spending on infrastructure impacted negatively on gross domestic product. Similar result was obtained from a study on

Tunisian economy by Ghali (1998) showing a long run negative relationship between government spending on infrastructure and economic growth.

In addition, studies by Ghani and Din (2006), Rehman et al. (2010) and the Planning Commission (2011) for Pakistan shows there is a negative or insignificant impact of aggregate public investments on growth. Estache et al. (2009) show for Mali that foreign aid-funded infrastructure does produce Dutch Disease effects, but that the negative impacts differ by the type of investment, while economic growth attenuates these negative effects.Nketiah-Amponsah (2009) show for Ghana that aggregate government expenditures over 1970–2004 negatively impacted economic growth.

A close examination of the literatures on the relationship between infrastructure and economic growth showed that most of the analyses were on direct transmission between spending on infrastructure and growth without recourse to other channels. In this study we examine the effect of institutions on infrastructure and economic growth, which is missing in other studies.

3. Methodology

In specifying the institutions, infrastructure and economic growth relationship in Nigeria, the study adopts the specification from a study of Esfahani and Ramirez (2003) for developed countries. The long-run specification of the relationship in Nigeria is given as:

$$LnRGDP_t = \beta_1 + \beta_2 OPEN_t + \beta_3 LnINFRAS_t + \beta_4 LnPOP_t + \beta_5 INST_t + \varepsilon_t \quad (1)$$

Equation (1) is the long-run relationship for the institutions, infrastructure and economic growth in Nigeria. $LnRGDP_t$is the log of the real gross domestic product, $OPEN_t$ is the degree of openness and it is the ratio of total trade with the real gross domestic product, $LnINFRAS_t$ is the log of capital expenditure on health and education, $LnPOP_t$ is the log of total population sourced from the Central Bank of Nigeria Statistical Bulletin.$INST_t$is the average of all the institutions variables sourced from the International Country Risk Guide (ICRG) database. Based on theoretical a-priori, we expectthe estimated coefficient of β_2 to β_5 to be positive.

To distinguish the short-run effects of institutions, infrastructure and economic growth nexusfrom their long-run effects, Equation (2) is specified in an error–correction modeling form. Following Pesaran et al.'s (2001) bounds testing approach and rewrite (1) as follows:

$$\Delta LnRGDP_t = \alpha + \sum_{i=1}^{n1} \beta_i \Delta LnRGDP_{t-1} + \sum_{i=0}^{n2} \delta_i \Delta OPEN_{t-1} + \sum_{i=0}^{n3} \varphi_i \Delta LnINFRAS_{t-1} + \sum_{i=0}^{n4} \gamma_i \Delta LnPOP_{t-1} + \sum_{i=0}^{n5} \omega_i \Delta INST_{t-1} + \rho_0 LnRGDP_{t-1} + \rho_1 OPEN_{t-1} + \rho_2 LnINFRAS_{t-1} + \rho_3 LnPOP_{t-1} + \rho_4 INST_{t-1} + \varepsilon_t \quad (2)$$

Without lagged level variables equation (2) will be a standard VAR model. The linear combination of lagged level variables have replaced the lagged error term from equation (1), resulting in error–correction model expressed in equation (2). To test for cointegration, the Pesaran et al. (2001) F-test for joint significance of the lagged level variables was used. Once cointegration is established, estimates of $\rho_1 - \rho_4$ normalized on $\rho_0$will yield the long-run effects of all exogenous variables. The short-run effects are reflected by the estimates of coefficients attached to first-differenced variables.

4. Results

Three unit root test namely Augmented Dickey Fuller (ADF), Phillips and Perron (PP) and the Ng and Perron (NP) was performed to determine the order of integration of the variables. The results of the unit root tests show that all the variables were stationary in their first differences except population which was significant at level with the ADF.

Table 1: Unit Root Test, 1984-2015

Variable	ADF	PP	NG-Perron
INST	-2.499	-2.402	-1.929
ΔINST	-7.028***	-7.065***	-2.646***
OPEN	-2.047	-2.106	-1.67
ΔOPEN	-5.093***	-5.074***	-2.618***
INFRAS	-0.97	-0.749	-0.886
ΔINFRAS	-5.990***	-5.966***	-2.706***
POP	-3.946***	0.113	-0.200
ΔPOP	-3.934***	-3.934***	-1.887*
RGDP	-1.782	-1.241	-1.489
ΔRGDP	-3.305**	-3.312**	-2.349**

Notes: In this paper for the NP test we use the test statisticMZ_t. Proper lag length foreach test was chosen byAIC.
***, **, * indicatessignificance levelat the 1%, 5% and 10% respectively

The study adopts the Pesaran et al (2001) approach to cointegration technique because we have different order of integration to estimate the error-correction model specified in equation (2). Using annual data for the period 1984-2015, the study imposed a maximum of four lags on each differenced variable and thereafter used the Schwarz Bayesian information criteria to select the appropriate lag length. The results of the study are reported in Panels A-Din Table 2. The first panel shows the bound test cointegration analysis. The second panels reports the short-run estimates, the third Panel reports the long-run estimates and the last panel reports diagnostic statistics. The result of the *F* bounds test in Panel A implies that at 1 per cent level, the null hypothesis of nocointegration among the variables in equation (2) was rejected. Thus, these variables co-moved in the long run.

From the short-run coefficient estimates in Panel A, it was discovered that the previous value of the gross domestic product and population have short-run significant coefficient obtained for every first-differenced variable, while trade openness, infrastructure and institution were statistically insignificant. In addition, the error correction is negative and statistically significant at 1 per cent level. Thus, the variables adjust back to long-run equilibrium and the speed of adjustment is about 54 per cent within a year in Nigeria

Table 2: Full Information Estimates for Institution, Infrastructure and Growth Relationship in Nigeria

Panel A : Bound Testing

F_{lrgdp} (LRGDP, OPEN, LINFRAS, LPOP, INST) 5.789***

Critical Values

1%		5%		10%	
I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
3.74	5.06	2.86	4.01	2.45	3.52

Panel B: Short-Run Estimates

Variables	Coefficient	S.E	T-test
D(LRGDP(-1))	0.491	0.188	2.606**
D(OPEN)	-0.156	0.171	-0.909
D(LINFRAS)	0.003	0.018	0.149
D(LINFRAS(-1))	0.029	0.021	1.456
D(LPOP)	88.670	26.023	3.407***
D(INST)	0.005	0.025	0.186
ECM	-0.535	0.134	-3.994***

Panel C: Long-Run Estimates

Variables	Coefficient	S.E	T-test
Constant	-46.158	5.519	-8.363***
OPEN	-0.717	0.546	-1.312
LINFRAS	-0.059	0.028	-2.059*
LPOP	2.804	0.269	10.396***
INST	0.097	0.048	2.002*

Panel D: Diagnostic Test

RESET	LM	Jarque-Bera	B-P-G Test	CUSUM	CUSUM-Square
1.285	2.465	3.101	1.064	Stable	Stable

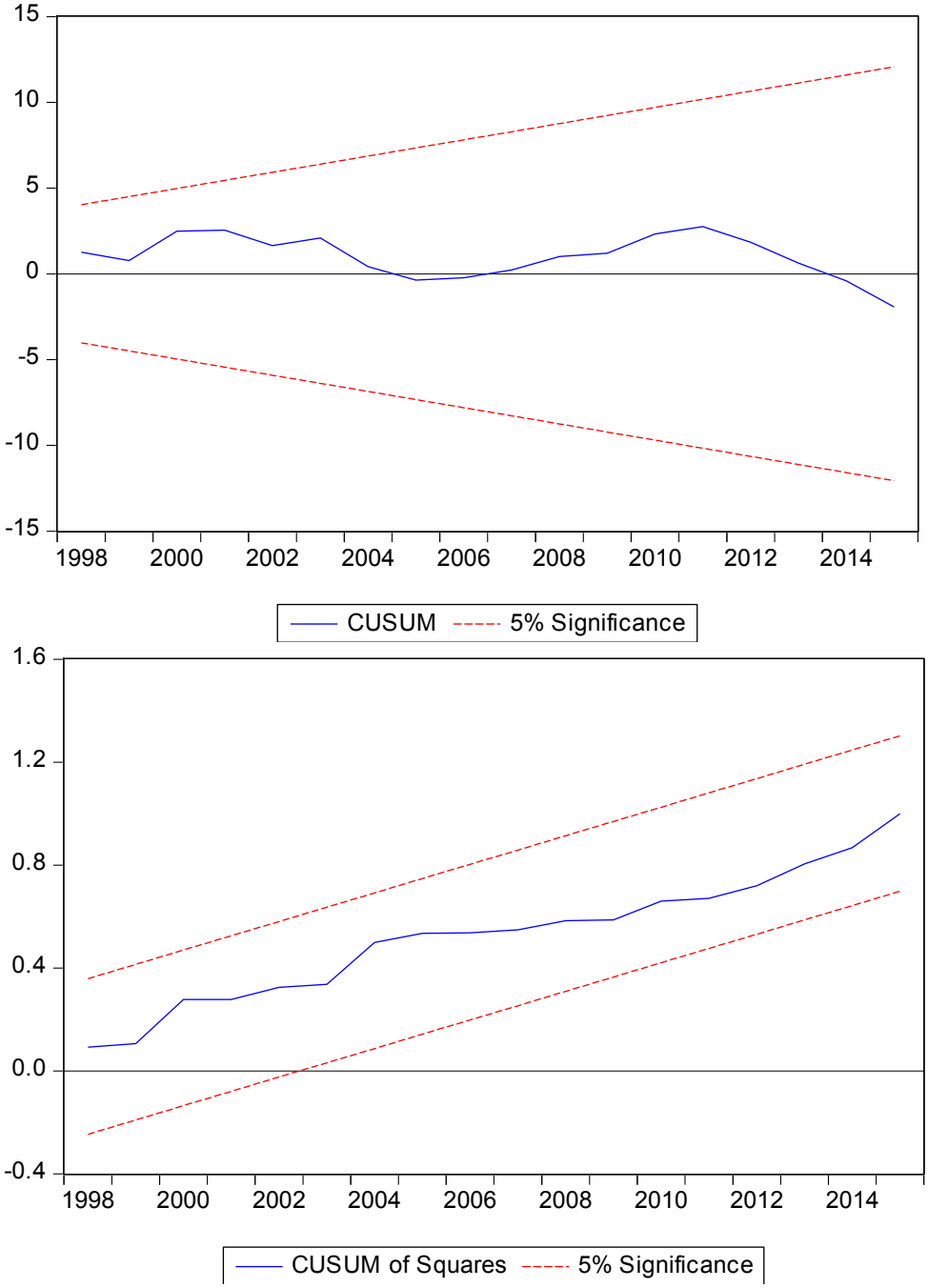
Note:(a)***,** and * indicate level of significance at 1, 5 and 10 percent respectively.
(b) Critical values are obtained from Pesaran et al (2001). The results for the ARDL approachwere generated using the MICROFIT software.
(c)RESET is the Ramsey's test for functional form.
(d) LM is the Lagrange multiplier test of first-order serial correlation.
(e) Jarque-Bera is the normality test
(f) B-P-G Test is the Breusch-Pagan-Godfrey heteroscedasticity test

Panel C, presents the long-run estimates of the model. It was discovered that all the variables of interest were significant except the trade openness variable. The infrastructure coefficient is negative and significant. This implies that public infrastructure contributes negatively to growth

in Nigeria, thus we can conclude majority of funds meant for infrastructure were either siphoned or mismanaged by the bureaucrats and politicians. Thus, a 1 per cent increase in infrastructure leads to 0.059 per cent decrease in growth. The population elasticity is positive and significant at 1 per cent level of significance. The result shows that a 1 per cent increase in the population growth will lead to 2.80 per cent in the level of growth. The institution variable also exerts a positive and but a weak significant effect on the level of growth in Nigeria. Thus, good institutions will promote growth in Nigeria. Thus, if the institution variables increase by 1 one per cent, the level of growth will increase by about 10 per cent. One significant feature from the short-run and the long-run estimates of the institution variable is that in Nigeria, is that institution does not have significant impact on growth in the short-run, but significant in the long run. The implication is that it will take time for institution to have a significant impact on the level of growth in Nigeria.

Panel D reports the diagnostic statistics for the institution, infrastructure and growth relationship in Nigeria.It should be noted that before drawing conclusions or making policy inference from the above regression models, it is important to perform relevant diagnostic tests in order to ascertain the reliability of theparameter estimates. Reported in Panel D, are the Lagrange multiplier (LM), Ramsey's RESET, Jarque-Bera and the Breusch-Pagan-Godfrey statistics. The LM statistic is used to test for first-order serial correlation, the RESET statistic is for model specification, while the Jarque-Bera statistic is to test the normality of the model and the Breusch-Pagan-Godfrey statistic is to test for heteroscedasticity. All the four statistics are insignificant supporting autocorrelation free residuals, correctly specified model, normality of the model and constant finite variance. Also, the CUSUM and the CUMUMSQ shows that the short-run and the long-run estimates are stable because the plots of the statistics are stay within a significance level of 5 percent.

Figure 1. Plots of CUSUM AND CUSUMSQ



5. Summary and Conclusion

This study examines the impact of institutions and infrastructures on economic growth in Nigeria. We contribute to the infrastructure-growth nexus literature in Nigeria by including institutions into the model. The justification for the inclusion of the variable is based on the fact that good institutions will induce growth and that it will serve as an impetus for investor to invest in Nigeria. The result shows that there is long-run cointegrating relationship using the bounds-testing approach of Pesaran et al (2001). The study also shows that in the short-run, it is only the past value of the gross domestic product and population that contributes to the level of growth in Nigeria. However, in the long run, we found that population and institutions contributes positively to growth and that public infrastructure has a negative significant impact on growth. The error correction shows that the variables adjust back to equilibrium by approximately 54 per cent within a year. The diagnostic tests shows that the model is free from autocorrelation residuals, correctly specified, has a normal distribution and constant finite variance. Also, the CUSUM and the CUMUMSQ shows that the short-run and the long-run estimates are stable. The policy implication of this result is that government should monitor her public infrastructure spending by reducing wastages so that it can contribute positively to growth. In addition, government of Nigeria should raise the standard on human capacity development as this contributes positively to growth. Also, government should adhere to good institutions so as to increase the inflow of foreign direct investment into Nigeria.

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