



Federal government tax independence, statutory quota and capital investment

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ABSTRACT

The enquiry arose from the necessity for a reevaluation of Nigeria's budgetary system. The current fiscal structure does not appear to be fair enough to foster social development in all of its ramifications. As a result, there is a void in infrastructure development in favor of citizens. The current study investigates the effect of federal government tax autonomy and statutory income on capital investment. The analysis spans the years 1990–2021 and using the ARDL, ECM and compound relapse method, revealing that the federal government's exclusive tax revenues have a large and beneficial influence on capital investment. The statutory allocation to the federal government, in divergence, has an insubstantial destructive impression on capital project spending. These findings suggest that statutory revenue at the federal level has little effect on capital project funding. There is also an existence of a long run relationship between federal government capital investment and the classes of earning applied in this investigation. The policy implication is that if the government does not expand its earning capacity, in the near future, the statutory income will be incapacitated in outlaying capital projects necessary to expand the economy. Study recommends outsourcing of more revenue avenues including foreign direct investment avenues.

Study novelty: The study's originality is that it employs ARDL approaches to give an unbiased justification for the government's growth of income sources. Above all, this is a pioneering work that expressly highlights the efficacy, or lack thereof, of the federal government's tax autonomy, therefore demonstrating the short and long term link between capital outlay on infrastructure and independent proceeds of the central administration.

1. Introduction

Capital investment is the greatest metric for measuring economic development and the helpfulness of financial reorganization in a country. A country with basic infrastructure and technology ensures a better future for both current and future generations. According to Ref. [1] political decentralization, monetary delegation, and managerial subsidiarity are the three types of decentralization. Local officials frequently take very thoughtless schedules in the perspective of monetary transference and partisan elevation in order to upsurge economic proceeds and amass governmental resources [2], such as souk subdivision [3,4], regime liability threat [5] and ecological fumes [6–8]. Thus, fiscal decentralization is primarily concerned with the transmission of pecuniary power and

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accountabilities from the principal administration to other echelons of control in order to improve municipal facility conveyance, stimulate trade and industry progression, foster social assets improvement, and expand operative infrastructure enlargement. However, the central government retains sole taxation authority and income earned by sections, subdivisions, and interventions. This is evident in Nigeria's fiscal framework.

Fiscal decentralization is firmly hallowed in the 1999 constitution of the Federal Republic of Nigeria. In Nigeria, financial regionalization is accomplished by income sharing from the federation account to the three levels of administration (Federal, State-owned and Indigenous Control Council). Out of the apportionment to the three stages of control in Nigeria, the Federal government takes a portion of 52.68%. Most importantly, the tax autonomy granted for Nigeria's three tiers of government has a major aim to develop an effective fiscal framework in which Nigeria's three tiers of government can effectively carry out their expenditure commitments. As a result, the Federal Republic of Nigeria (FRN) constitution of 1999 arranges tax collection in such a manner that the Federal, State, and Local Governments each have a certain amount of taxes to collect on their own. Nigeria's first layer of government is the federal government, which has tax autonomy to the extent granted under the second schedule part II of the 1999 constitution. The Federal Government is solely responsible for collecting taxes such as company income tax, withholding tax, and fuel income levy, consumers' tax, tutelage tax, wealth achievements tax from Abuja residents and corporate bodies, stamp duties on corporate entities, and personal income tax from the armed forces, police, residents of the Federal Capital Territory of Abuja, and foreign affairs.

The federal government's independent revenue also includes funds collected by the federal government that it owns solely [9]. These additional exclusive funds are raised by federal government agencies such as the Dominant Bank, the Guarantee Indemnification House, the Safeties and Altercation Command, the Haulers Board, the Trade Advancement Body, the Countrywide Wellbeing Protection Arrangement, the Nigerian Civil Aeronautics Specialist, the Sea port Expert, the Oceanic Management and Protection Organization, and the TV set Buff [10,11]. As part of the endeavor to prevent revenue leakages that harm economic growth, Section 22 (2) of the Fiscal Responsibility Act of 2007 mandates agencies to submit 80% of their operational surpluses to the FGIR. Accounting Officers/Chief Executive Officers of Ministries, Departments, and Agencies (MDAs) who fail to return income as required by the Act face fines including appointment non-renewal [11]. As stated by the Senate, Federal Republic of Nigeria (FRN) 2015, to guarantee that payments to the FGIR are not negotiable, this why current government policy limits government-owned companies' expenditure to a maximum of 75% of earnings. The Treasury Single Account was created to avoid income leaks as well. The adoption of the E-collection program will improve the efficiency and consistency of income remittances from MDAs [11]. Fiscal policy initiatives that serve to control FGIR sources are intended to improve the functioning of the Nigerian economy and, in particular, to increase government income [12]. When fiscal activities, particularly in FGIR, result in a shortfall, the Federal Government frequently borrows from the CBN to fund its expenditure commitments [13].

The majority of prior research has been on the effects of financial reorganization on trade and industry development [14,15], oomph ingesting, and secretion decline [8,16–18]. Resource distribution arrangements are frequently exchanged between principal and native establishments, depending on a variety of variables such as interregional fairness, the obtainability of wealth at all echelons of control, and indigenous financial administration capability. Ultimately, the Federal Government is required to invest extensively in developmental projects through the development fund. The Enlargement Reserve was recognized by Section 25 of the Finance (Control & Management) Act of 1958 and was ratified by the 1999 Constitution of the Federal Republic of Nigeria. The Fund was formed to fund capital development initiatives. Therefore, it becomes very expedient for policy makers and scholars to begin to emphasis on provision of huge finances for public capital projects such as industries, roads, hospitals, learning and skill acquisition centers. Experience with fiscal decentralization has resulted in the development of capability in spending and income allocation, as well as the creation of fiscal transfer formulae and sub-national borrowing.

In Nigeria, the discourse over revenue mobilization has mainly centered on the need to boost state and county authorities' financing bandwidth in light of their struggling to fulfill their contractual needs of improving social products and services to individuals within their governmental bailiwick. Another viewpoint, on the other hand, alleges that public - sector quality in terms of the effectual use of available capital in the provision of social goods and items is, at finest, insufficient due to a deficiency of transparency, formalities, a fete mindset, and innovation performance. Decentralization, as an integral component of the fiscal system, influences the behavior of all economic agents. As a result, the suggested study's importance is undeniable. With an in-depth assessment of several studies on fiscal structure of nations that have ensued over time, it is essential to admit that this contemporary learning is very crucial because it centers on the application of funds at the apex level of government in Nigeria, to drive developmental projects in the country.

Nigeria, Africa's largest economy, has a \$221 billion capital investment gap, equal to fifty-one percent of GDP. Poor transportation facilities and poor online and offline connection have hampered trade between the Economic Community of West African States (ECOWAS) or regions and stifled business development in the entire area. The policy document, ECOWAS 2050 Vision, sets out the continent's targets for establishing a zone of free trading, shared markets, and development of infrastructure in order to build a harmonious community in an economically secure zone with solid structures. The potential contribution of this study to this relevant policy or infrastructural development strategy is to address the gap that has long existed and affected the free trading among the ECOWAS regions. Most importantly, for the fact that Nigeria is presently having the opportunity of being the leading country in this present arrangement following the emergence of the new president (President Bola Ahmed Tinubu), it becomes more expedient that all resources from the three arms of the government should be used to strengthen infrastructural development in the country. This will engender economic expansion in the African region as well as motivating other member countries in the ECOWAS free trading arrangement to do the same.

1.1. Review of literature

Jia et al. [19] investigated the waves of monetary subsidiarity on local expenditure policy in China through application of enormous monetary numbers at the county level from 1997 to 2006. The study also viewed at the power of fiscal imbalance, and the estimates showed that spending decentralization boosted government expenditures. The government spent a lot of money on capital building, but less on education and administration. On the other hand, revenue decentralization has little impact on local government spending. As a result, the study validated the fiscal decentralization philosophy based on the common-pool problem. Siliverstovs and Thiessen [20] determined if equalization outgoings among constituencies and allocations from the federal control encouraged or stifled regional growth. Assessing records of 22 French counties from 2002 to 2008, the study concluded that the fiscal equalization scheme had a favorable effect on regional economic growth. The approach employed two indicators: the transfer volume measure (which was represented by either tax receipts in other areas or transfers to districts) and the negligible holding ratio. The key result was that the transfer volume impact boosted progression in both benefactor and beneficiary countries.

Bella et al. [21] explained Russia's economic federalism by analyzing the mechanisms via which it functioned, and evaluated the efficacy of provincial transferences in decreasing county imbalances. The findings showed that centralized payments to constituencies helped to reduce inequalities caused by discrepancies in district tax bases and financial returns. This enabled regions with lower per capita incomes to build social and corporeal assets at a faster rate. There was minimal evidence that transferred enhanced cross-regional development harmonization. The findings also indicated that federal payments did not considerably enhance regional budgetary maintenance. Adefeso [22] focused on the true power of financial decentralization on sustainable development in Sub-Saharan Africa, which had received little attention. Due to data restrictions from the continent, the study used a panel data model on the five selected African nations from 2009 to 2014 for both the spending and revenue decentralization indexes. The study discovered data to back up the prior findings. The findings indicated statistically significant negative and positive effects of spending and revenue decentralization on long-term economic growth.

Magazzino et al. [23] examined monetary strategy continuity in a distributed setting for the G-7 nations from 1980 to 2015. The income gap and sovereign debt had a definite co-integration connection. The study also discovered a reciprocal causation flowing across governmental receipts and expenses, and also between the country's official obligation and shortfall. Pasichnyi et al. [24] provided an updated way to assessing the sway of financial transference on cost-effective enlargement. Therefore, the findings revealed that takings restructuring was made known to be linked with lesser growing proportions, but outgoings reshuffle might slightly promote economic development. Nguyen et al. [25] assessed the concurrent link between monetarist reformation, corruption, and economic disparity among Vietnamese outlying areas from 2011 to 2018. Practical data indicated a significant concurrent liaison: increasing venality upturns provincial economic inequalities, earnings disproportion, and economic reform. Furthermore, the findings showed that an increase in per-capita income would diminish or better manage sleaze in every region. The amount of rise in revenue disparity that lowered financial subsidiarity was as identical as the degree of increase in trade liberalization. All of these examples showed a link between fiscal decentralization, corruption, and economic disparity. From the findings, financial delegation had a favorable impact on trade and industry evolution in an area with good public governance quality.

Fan et al. [26] used a replicated contributory factor technique to causally analyze the impacts of the policy shock on growth, interregional inequality, and urban–rural disparity from 2002 to 2003 change in China's central–local tax sharing regime as an exogenous policy shock. The study found that the smaller local tax share of local governments led to weaker growth. The study also revealed that the increased central transfers aided in reducing interregional disparities in per capita GDP and per capita income while the equalizing benefits were primarily seen in urban earnings. Omodero and Adeyemo [27] investigated the impact of local authority forms of income on infrastructure investment in Nigerian City Councils from 1998 to 2018. In accordance with the research results, only statutory disbursements from the national and state governments had a considerable influence on regional government major infrastructure creation in Nigeria. Guo et al. [8] investigated the influence of fiscal decentralization on environmental pollution, as well as the function of government environmental preferences in China's provinces. The findings indicated that budgetary revenue decentralization worsened local environmental degradation more than spending decentralization.

Hammayo et al. [28] used the Conventional Least Square modelling approach to assess the influence of state revenues on infrastructure improvements in Bauchi State Authority from 2006 to 2018. The test's results showed that the proportion of allotment acquired from the national treasury, as well as loans, both had a substantial beneficial effect on infrastructural facilities, but internally produced revenue had a negative and significant association. Other revenues, which included donations from municipal councils for the accomplishment of collaborative projects, as well as donations and support from local and international governments, suggested a favorable but small link. According to Adeleke et al. [29], sub-national public funds was densely deployed, with federal distribution accounting for the majority of sub-national state spending, implying weak internal cash flow production by states. The observations of Odinakachi et al. [30] revealed that the central government conserved money; non-oil earnings and recurring spending were sufficient to explain the link with output growth term, but infrastructure investment was not. In the foreseeable future, national govt. maintained funds was also proven to be statistically relevant. Based on these data, it was determined that the federal administration's reserved earnings, non-oil profits, and cyclical spending are the most crucial developmental determinants.

Canare [31] examined the link between decentralization and wellbeing. The empirical study used data from Philippine provinces to investigate the link between several decentralization indices and wellbeing, as assessed by per capita income, the human development index, and poverty. Fiscal independence, or the ability of local governments to produce their own resources to pay their own expenditures rather than relying on central government transfers, appeared to be positively related to per capita income and HDI. Lin and Zhou [32] employed provincial panel data from 1995 to 2017 to empirically investigate the impact of vertical fiscal imbalance (VFI) on industrial structure upgrading from the viewpoints of regional heterogeneity, influence pathways, and marginal effect in China. The

empirical findings indicated that VFI was not advantageous to the rationalization and progress of industrial structure, but this influence varies significantly among regions. The study also revealed that VFI influenced industrial structure improvement through three channels: investment-driven effect, market mechanism distortion effect, and technological innovation crowding effect. The study further disclosed that, as the industrial structure became more rationalized and advanced, the marginal restraining impact of VFI became more forceful. As a result, it is critical to regulate VFI as much as possible between the central government and the local governments in order to upgrade the industrial structure. Omodero [33] investigated the extent to which revenue generated by states and distribution from the federation account influence capital development in Nigeria. The multiple regression approach was employed to arrive at the empirical evidence, which demonstrated that the states' tax endeavors did not contribute tangibly in building infrastructure. On the other hand, the findings revealed that the statutory allocation to states had a substantial impact on state infrastructure projects.

1.2. Study resources and technique

This enquiry considers the waves of Federal Government tax autonomy and statutory allocation on capital investment in Nigeria. The work spans from 1990 to 2021 and utilizes ancillary type of statistics derived from the springs indicated in Table 1. Secondary data for this study were gathered from sources indicated in Table 1 (CBN Annual reports and statistical bulletin) using a data collection sheet. The study used an ex-post facto research strategy to provide test findings through Bound tests, Autoregressive distributive (ARDL) short and long run estimations, and projections. To avert the misspecification issue, it is crucial to verify the fixed circumstances of the variables prior to conducting a time series analysis [34]. As a result, we used the Augmented Dickey-Fuller (ADF) test to determine whether all variables were stationary. The ARDL model is used in econometrics to evaluate the longstanding relationship between two or more factors based on stationarity metrics. The ARDL bound-testing technique, as advocated by Refs. [35,36], was used to determine the both long- and short-term dynamic behavior of Federal Government tax autonomy and statutory allocation and capital investment. The ARDL bound-testing method was selected over other analytical techniques because it allows parameters to be static to various extents [I(0), I(1)] and explanatory variables to have distinct appropriate lag lengths when using the traditional co-integration process [36,37]. The outcomes – individually and collectively - are decided considerable at 5% mark of importance. The variables are poised and expressed in their Naira value (indigenous exchange) since there was no difference in their value narratives.

The regression model corroborated in this study is accessible below:

$$IFDV = f (FGIR, FGSA) \tag{1}$$

where.

- IFDV = Infrastructural development.
- FGIR = Federal Government Internally Generated Revenue.
- FGSA = Federal Government Statutory Allocation.

The above well-designed formula is epitomized broadly as follows:

$$Y_{1t} = \alpha + \beta_1 X_1 + \beta_2 X_2 + \mu_i \tag{2}$$

where:

- Y₁ = Infrastructural development.
- X₁ = Federal Government Internally Generated Revenue.
- X₂ = Federal Government Statutory Allocation.
- β = Controls the connection concerning the self-determining property X and the retort Element Y.
- α = Unbroken; X₁-X₂ = Reversion measurements; μ_i = Miscalculation stint.
- The untested initial guess, it is imagined that: X₁ > 0, X₂ > 0.

1.3. ARDL model specification/estimation

The universal ARDL (p,q) model is identified as follows:

Table 1
Variables description and source.

Variable	Description	Data measurement	Data collection period	Source
IFDV	Infrastructural development	Measured in domestic currency (Naira)	1990–2021	CBN Statistical Bulletin https://www.cbn.gov.ng/documents/Statbulletin.asp
FGIR	Federal Government Internally Generated Revenue	Measured in domestic currency (Naira)	1990–2021	CBN Annual Reports https://www.cbn.gov.ng/documents/Statbulletin.asp
FGSA	Statutory Allocation to the Federal Government	Measured in domestic currency (Naira)	1990–2021	CBN Statistical Bulletin https://www.cbn.gov.ng/documents/Statbulletin.asp

Source: Compilation by Authors, 2022

$$Y_t = \gamma_0 + \sum_{i=1}^p \delta_i Y_{t-i} + \sum_{i=1}^q \beta_i X_{t-i} + \epsilon_{it} \tag{3}$$

Where: Y_t is a vector and the variables in (X_t) are allowed to be purely $I(0)$ or $I(1)$ or co-integrated; β and δ are coefficients; γ_0 is the constant; $I = 1, \dots, k$; p, q are optimal lag orders; ϵ_{it} is the vector of the error terms in unobservable zero mean white noise vector process (serially uncorrelated or self-determining). p lags represents the dependent variable while the q lags is used to denote the exogenous/independent variables.

To perform the bound test for cointegration, the conditional ARDL (p, q_1, q_2) model with 3 variables is specified as shown below.

1.4. First of all the following hypotheses apply

H0. $b_{1i} = b_{2i} = b_{3i} = 0$ (No co-integration exists in these series)

H1. $b_{1i} \neq b_{2i} \neq b_{3i} \neq 0$ (Co-integration occurs in these series)

(Where $i = 1, 2, 3$).

1.5. Therefore, the specification for bound test include

$$\begin{aligned} \Delta \ln \text{ifdv}_t &= \alpha_{01} + b_{11} \ln \text{ifdv}_{t-1} + b_{21} \ln \text{fgsa}_{t-1} + b_{31} \ln \text{fgir}_{t-1} + \sum_{i=1}^p \alpha_{1i} \Delta \ln \text{ifdv}_{t-i} + \sum_{i=1}^q \alpha_{2i} \Delta \ln \text{fgsa}_{t-i} + \sum_{i=1}^q \alpha_{3i} \Delta \ln \text{fgir}_{t-i} + e_{1t} \end{aligned} \tag{4}$$

$$\begin{aligned} \Delta \ln \text{fgsa}_t &= \alpha_{02} + b_{12} \ln \text{ifdv}_{t-1} + b_{22} \ln \text{fgsa}_{t-1} + b_{32} \ln \text{fgir}_{t-1} + \sum_{i=1}^p \alpha_{1i} \Delta \ln \text{fgsa}_{t-i} + \sum_{i=1}^q \alpha_{2i} \Delta \ln \text{ifdv}_{t-i} + \sum_{i=1}^q \alpha_{3i} \Delta \ln \text{fgir}_{t-i} + e_{2t} \end{aligned} \tag{5}$$

$$\begin{aligned} \Delta \ln \text{fgir}_t &= \alpha_{03} + b_{13} \ln \text{ifdv}_{t-1} + b_{23} \ln \text{fgsa}_{t-1} + b_{33} \ln \text{fgir}_{t-1} + \sum_{i=1}^p \alpha_{1i} \Delta \ln \text{fgir}_{t-i} + \sum_{i=1}^q \alpha_{2i} \Delta \ln \text{ifdv}_{t-i} + \sum_{i=1}^q \alpha_{3i} \Delta \ln \text{fgsa}_{t-i} + e_{3t} \end{aligned} \tag{6}$$

1.6. Short run specifications

$$\Delta \ln \text{fgsat} = \sum_{i=1}^q \alpha_{2i} \Delta \ln \text{ifdv}_{t-i} + \sum_{i=1}^q \alpha_{3i} \Delta \ln \text{fgir}_{t-i} + e_{2t} \tag{7}$$

$$\Delta \ln \text{fgir}_t = \sum_{i=1}^q \alpha_{2i} \Delta \ln \text{ifdv}_{t-i} + \sum_{i=1}^q \alpha_{3i} \Delta \ln \text{fgsa}_{t-i} + e_{3t} \tag{8}$$

1.7. Long-run model specification is highlighted below

$$\ln \text{ifdv}_t = \alpha_{01} + b_{11} \ln \text{ifdv}_{t-1} + b_{21} \ln \text{fgsa}_{t-1} + b_{31} \ln \text{fgir}_{t-1} + e_{1t} \tag{9}$$

1.8. Error correction model (ECM) specification

$$\Delta \ln \text{ifdv}_t = \alpha_0 + \sum_{i=1}^p \alpha_{1i} \Delta \ln \text{ifdv}_{t-i} + \sum_{i=1}^q \alpha_{2i} \Delta \ln \text{fgsa}_{t-i} + \sum_{i=1}^q \alpha_{3i} \Delta \ln \text{fgir}_{t-i} + \lambda \text{ECM}_{t-1} + e_t \tag{10}$$

The study’s limitations in terms of secondary data application and analysis. One of the major challenges encountered during the course of this study was the researchers’ inability to contact some top government officials in charge of budgeting and allocating federally collected revenue. As a result, the study focuses on secondary data from the CBN website. However, to avoid misleading results, the data unit test indicate that the use of ARDL and ECM techniques are the most appropriate tools for this study.

Table 2
Unit root test.

Variables	ADF T-Statistic	Critical Value @ 5%	P-Value	Order of integration	remarks
LNIFDV	-6.27	-2.96	0.00	1(1)	Stationary
LNFGSA	-4.44	-2.96	0.00	1(1)	“
LNFGIR	-4.27	-2.96	0.00	1(0)	“

Author’s calculation, 2022.

1.9. Data analysis and interpretation

The unit root test of the parameters used in this inquiry is shown in Table 2. The unit root test results show that lnIFDV and lnFGSA are stationary at first difference or order 1, whereas FGIR is stationary at level or order 0. The ARDL is often used when the research variables are steady at orders 1 and 0.

The bound test assessments in Table 3, are based on the hypothesis that no co-integration exists among the three variables used in this study. The null hypothesis is accepted if the F-statistic is less than the 1(0) bound but not more than the 1(1) bound. The bound test is also decided after the ARDL has been estimated, and so the bound test is an extension of the investigation to arrive at the correct tools to utilize for short and long run estimations. Table 3 shows the outcomes of the three bound tests predicted for this investigation. According to the data in Table 3, there is a long-run link when the lnIFDV is the dependent variable. In this instance, the Error Correction Model is employed for evaluation. However, because there are no co-integrations, ARDL has been used in the other circumstances.

The ARDL estimate is produced to evaluate the existence of long and short run co-integration among the research parameters using the bound test. Table 4 shows the ARDL outcome where IFDV is the dependent variable and FGSA and FGIR are the independent variables. According to the analysis in Table 5, the Federal Government Internally Generated Revenue (FGIR) has a statistically significant influence on infrastructure development. The results also reveal that the IFDV lag value has a positive and significant influence on it, but the FGSA has an unfavorable impact on capital investment. These results do not synchronize with the outcomes from states and local councils as seen in Refs. [27,33]. There is no serial correlation, as indicated by the Durbin-Watson coefficient of 2.2, and the model is appropriate for this study, as evidenced by the F-statistic p-value of 0.000, which is considerably below the significant value of 0.05. When the model forecast is taken into account, the standard error of regression, which is 0.19, demonstrates the correctness of the parameter estimates.

1.10. Long-run model specification

$$\text{Lnifdv}_t = \alpha_{01} + b_{11} \text{lnifdv}_{t-1} + b_{21} \text{lnfgsa}_{t-1} + b_{31} \text{lnfgir}_{t-1} + e_{1t}$$

E-views inputs: lnifdv C lnifdv(-1) lnfgsa(-1) lnfgir(-1).

1.11. Model specification for ECM

$$\Delta \text{lnifdv}_t = \alpha_0 + \sum_i^p = 1 \alpha_{1i} \Delta \text{lnifdv}_{t-i} + \sum_i^q = 1 \alpha_{2i} \Delta \text{lnfgsa}_{t-i} + \sum_i^q = 1 \alpha_{3i} \Delta \text{lnfgir}_{t-i} + \lambda \text{ECM}_{t-1} + e_t$$

Inputs into E – views
: d(lnifdv) C d(lnifdv(-1)) d(lnfgsa(-1)) d(lnfgir(-1)) ecm(-1)

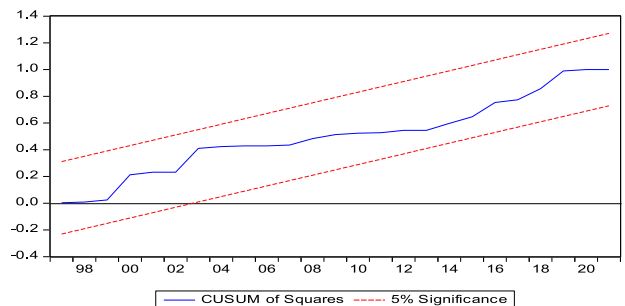
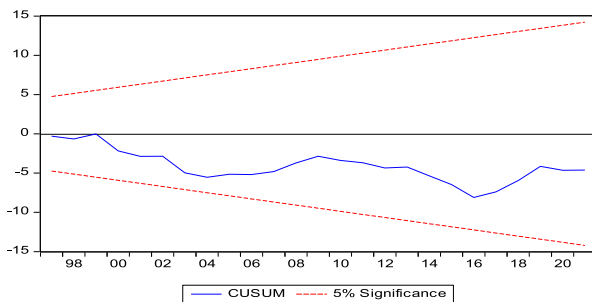


Table 5 shows the outcome of the long-run test. The results of the Error Correction Model (ECM) demonstrate that the Federal Government Statutory Allocation (FGSA) has a negligible influence on infrastructure development. This result is in contrast with the findings of [27,33] (Omodero, 2022; Omodero & Adeyemo, 2020) where statutory allocation significantly impacted on capital

Table 3
Bound tests.

Variables	F-Statistic	1(0) Bound @ 5% level	1(1) Bound @ 5% level	Co-integration
Lnifdv = f(lnfgsa, lnfgir)	5.48	3.79	4.85	There is co-integration or long-run relationship. ECM is estimated.
Lnfgsa = f(lnfgir, lnifdv)	2.05	3.79	4.85	No co-integration. ARDL is estimated.
Lnfgir = f(lnifdv, lnfgsa)	1.68	3.79	4.85	No co-integration. ARDL is estimated.

Author’s calculation, 2022.

Table 4
ARDL result before bound test Dependent Variable: LNIFDV.

Method: ARDL				
Sample (adjusted): 1991 2021				
Included observations: 31 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob. ^a
LNIFDV(-1)	0.312015	0.106026	2.942811	0.0066
LNFGSA	-0.372126	0.074991	-4.962260	0.0000
LNFGIR	0.885068	0.128421	6.891935	0.0000
C	0.731245	0.176883	4.134061	0.0003
R-squared	0.974409	Mean dependent var		6.103927
Adjusted R-squared	0.971566	S.D. dependent var		1.138400
S.E. of regression	0.191962	Akaike info criterion		-0.343127
Sum squared resid	0.994932	Schwarz criterion		-0.158096
Log likelihood	9.318463	Hannan-Quinn criter.		-0.282811
F-statistic	342.6900	Durbin-Watson stat		2.246292
Prob(F-statistic)	0.000000			

Authors' calculation, 2022.

^a Note: p-values and any subsequent tests do not account for model selection.

Table 5
Long-run test result Dependent Variable: D(LNIFDV).

Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.006701	0.063987	0.104728	0.9174
D(LNIFDV(-1))	0.357239	0.259295	1.377730	0.1805
D(LNFGSA(-1))	-0.307870	0.220158	-1.398407	0.1743
D(LNFGIR(-1))	0.747883	0.295736	2.528888	0.0181
ECM(-1)	-1.418153	0.308288	-4.600097	0.0001
R-squared	0.503803	Mean dependent var		0.139256
Adjusted R-squared	0.424412	S.D. dependent var		0.333034
S.E. of regression	0.252665	Akaike info criterion		0.237506
F-statistic	6.345816	Durbin-Watson stat		2.059990
Prob(F-statistic)	0.001145			

Authors' calculation, 2022.

investments at the state and local authorities. The policy consequence of this research outcome is that it is high time the central government reduced reliance on constitutional allotment for capital projects. The policy makers should source other fiscal methods of improving revenue for capital development of the country. The lag in IFDV has no effect on the capital project outlay. However, Federal Government Independent Revenue once again has a significant positive impact on infrastructure development. The policy implication is that the central government will require additional independent resources outside of the statutory provision to establish a solid infrastructure foundation that will boost the country's wealth development. Such sources include development of other mineral resources and abandoned industries that are lying fallow in almost all the 36 states of the country.

Based on short-run evaluations, when the FGIR was used as the dependent factor, almost all of the factors had a negligible influence on the FGIR (see [Appendix 3b](#)). That is, infrastructure development and federal constitutional revenue cannot determine the amount of autonomous income generated by the central government in the near run. It will take some time for it to make a tangible impact. Both the FGSA lag variable and the IFDV have a large positive impact on FGSA in the same short run estimation (see [Appendix 3b](#)), however the FGIR has a considerable negative impact on FGSA.

1.12. Concluding remarks

The research investigates the influence of federal government taxing powers and statutory income on Nigerian capital investment. This research arose from the necessity for infrastructure expansion within the country's current fiscal framework. The prior assumption is that the federal government's taxation powers and statutory earnings will have a favorable and considerable impact on infrastructure provisions. According to the evaluation utilizing federal tax autonomy and statutory allocation, the statutory allocation appears to have a large negative influence on capital investment, but the federal government's independent revenue appears to have a considerable positive influence. Both results are quite significant, implying that funds controlled by Nigeria's first tier of government are very important to capital projects at the central level. Most important policy implication is that, it is very imperative especially in pursuance of Sustainable Development Goal (SDG) 9 which focuses on industry, innovation and infrastructure development on nations. With the realization of infrastructural development, inequality among citizens will reduce (SDG 10) and SDG 11 will also be achieved because when infrastructural development in cities and communities are sustained as specified by this goal, poverty will be

alleviated (SDG 1) and citizens will be more enlightened (SDG 4) to what they can do (SDG 8) to make an honest living.

As a result, this study suggests rethinking of fiscal devolution in Nigeria in order to provide lower-level governments (state and municipal) a larger share of taxing powers and statutory appropriations. As a consequence, the country will see more equal growth and better resource management which will also reduce the expenditure responsibilities at the center. According to the report, policy-makers should come up with innovations that will increase the central government’s income base through overseas cooperation in research and development economic initiatives. It is critical that the government begin to address environmental and security challenges that are impeding foreign direct investment inflows into the nation. A favorable business climate will encourage more international investors to collaborate with the government. It is also critical to examine the country’s tax system in light of the country’s excessive expectations on the private sector. In order to broaden the central government’s income base, this research proposes cracking down on corruption by putting men and women of integrity in positions of trust. In this study, it is also appropriate to indicate that adequate budgetary control will be extremely helpful in controlling resources and achieving greater long-term infrastructure development. We used ARDL and ECM for this investigation following the unit root results of order one and zero. However, this method may not be suitable in a situation where datasets appear to have different orders such as 2 or more. The method is not also convenient where long or short run investigation outcomes may not be the focus.

Author contribution statement

- Cordelia Onyinyechi Omodero and Philip O. Alege: conceived and designed the research.
- Cordelia O. Omodero and Philip O. Alege: performed the experiments.
- Cordelia Onyinyechi Omodero: analyzed and interpreted the data.
- C. O. Omodero and P. O. Alege: contributed reagents, materials, analysis tools or data.
- Cordelia Onyinyechi Omodero: wrote the paper.

Data availability statement

Data will be made available on request.

Declaration of competing interest

Authors declare no conflict of interest and promise to make data available to everyone that makes request for it.

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Appendix

Appendix 1

VAR Lag Order Selection Criteria Endogenous variables: LNIFDV

Variable Lag	Lag (0)	Lag (1)
logL	4.55	8.59
LR: Sequential modified LR test statistic (@ 5% level)	0	7.00*
FPE: Final prediction error	0.05	0.04*
AIC: Akaike information criterion	-0.10	-0.31*
SC: Schwarz information criterion	0.04	-0.12*
HQ: Hannan-Quinn information criterion	-0.06	-0.25*

Author’s calculation, 2022.

* indicates lag order selected by the criterion.

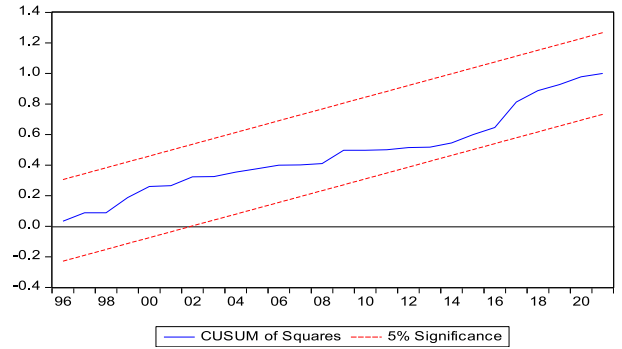
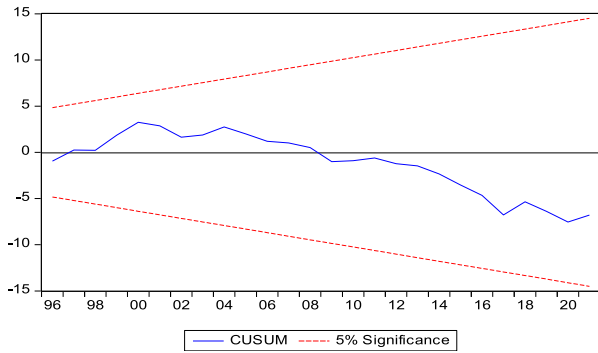
Appendix 2

VAR Lag Order Selection Criteria Endogenous variables: LNFGSA

Variable Lag	Lag (0)	Lag (1)
logL	-10.55	0.71
LR: Sequential modified LR test statistic (@ 5% level)	0	19.62*
FPE: Final prediction error	0.14	0.07*
AIC: Akaike information criterion	0.87	0.21*
SC: Schwarz information criterion	1.01	0.40*
HQ: Hannan-Quinn information criterion	0.92	0.27*

Author’s calculation, 2022.

* indicates lag order selected by the criterion.

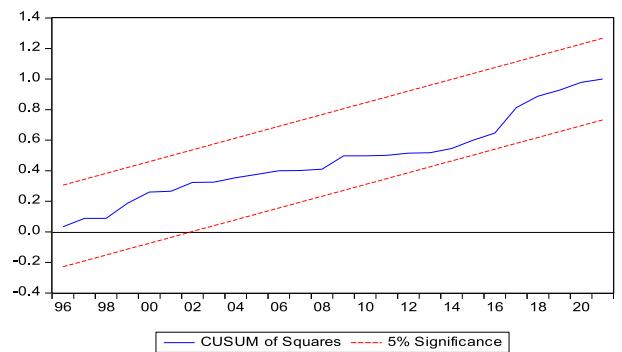
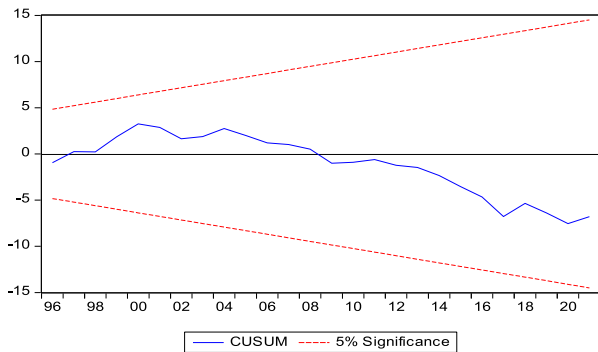


Appendix 3

Short-run model specifications. (a), $\sum_i^q = 1 \alpha_{2i} \Delta \lnifdv_{t-1} + \sum_i^q = 1 \alpha_{3i} \Delta \lnfgir_{t-1} + e_{2t}$. Input in e-views software: d(lnfgsa) C d(lnfgsa(-1)) d(lnifdv(-1)) d(lnfgir(-1))

Dependent Variable: D(LNFGSA)				
Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.085005	0.062356	1.363215	0.1845
D(LNFGSA(-1))	0.564637	0.253312	2.229017	0.0347
D(LNIFDV(-1))	0.536811	0.230322	2.330703	0.0278
D(LNFGIR(-1))	-0.620406	0.332903	-1.863624	0.0737
Durbin-Watson stat	2.034055			

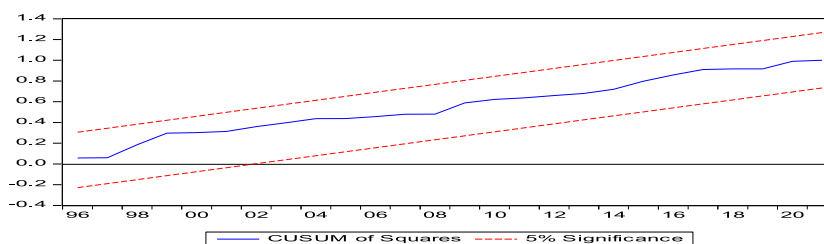
Authors' calculation, 2022.



(b), $\sum_i^q = 1 \alpha_{2i} \Delta \lnifdv_{t-1} + \sum_i^q = 1 \alpha_{3i} \Delta \lnfgsa_{t-1} + e_{3t}$. E-views inputs: d(lnfgir) C d(lnfgir(-1)) d(lnifdv(-1)) d(lnfgsa(-1))

Dependent Variable: D(LNFGIR)				
Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.169394	0.061775	2.742107	0.0109
D(LNFGIR(-1))	-0.115251	0.329799	-0.349459	0.7296
D(LNIFDV(-1))	0.086520	0.228174	0.379185	0.7076
D(LNFGSA(-1))	-0.007383	0.250950	-0.029422	0.9768
Durbin-Watson stat	1.834128			

Authors' calculation, 2022.



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