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Assessing the Relationships between Fiscal Deficit, Economic and Social Infrastructure in Nigeria: Evidence from an ARDL Approach

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Abstract. In developing nations such as Nigeria, fiscal deficits are a central Issue in economic discourse, particularly where they intersect with infrastructure development. This study explores the relationship between fiscal deficits and infrastructure development in Nigeria, focusing on both economic and social infrastructure, using annual time series data from 1986 to 2021. The aim is to investigate how fiscal deficits influence infrastructure development in both the short and long run, with a focus on the roles of government spending and access to key infrastructure services. The study hypothesises that fiscal deficits may exacerbate infrastructure gaps, particularly in education, healthcare, and transportation. Using the Autoregressive Distributed Lag (ARDL) model, the results reveal that in the short run, variables such as access to electricity, air transport passenger traffic carried, government spending on health, and air transport freight exhibit a detrimental effect on fiscal deficit, although these effects are not statistically significant. Conversely, the long-term estimates show that increased health and education spending significantly worsen the fiscal deficit, underscoring the fiscal burden of social infrastructure investment. The study suggests that strategic investments in education, health, and electricity are critical for long-term economic expansion. At the same time, it highlights the potential risks associated with excessive recurrent expenditure, which can undermine long-term fiscal stability. The theoretical implications of the findings align with Keynesian and Endogenous Growth theories, while practical significance lies in providing policy recommendations for strategic investment in infrastructure to foster economic development, enhance social well-being, and improve Nigeria's global competitiveness.

Key words: fiscal deficit; infrastructure development; Nigeria; ARDL model; education; healthcare.

JEL E62, 018, O55, C32, I21, I18

1. Introduction

Fiscal deficits are a critical tool used by governments, particularly in developing nations, to address pressing economic demands and enhance public welfare [1]. In Nigeria, fiscal deficits have been a prominent aspect of economic planning. However, while fiscal deficits aim to solve immediate needs, they can have unintended consequences, especially in infrastructure development. Nigeria's uneven infrastructure distribution has contributed significantly to regional agitations and political instability. Despite the country's rapid population growth and increasing demand for infrastructure, areas such as education, healthcare, transportation, and

housing remain severely underdeveloped. This infrastructure deficit has hindered Nigeria's efforts to achieve inclusive growth and sustainable development [2, 3].

In relating fiscal deficit and infrastructure development, it can be said that fiscal deficit is neither desirable nor bad in and of itself. It can, however, be evaluated in light of the current economic climate. A nation experiencing a budget deficit due to the construction of infrastructure or making wise investments that will generate more revenue or taxes in the future is often considered healthier than one suffering from a deficit caused by unsustainable expenses [4].

Additionally, countries that spend more on capital than recurrent expenditure tend to experience growth. Unfortunately, in Nigeria, state government expenditures have been largely geared towards recurrent spending, leaving little for capital outlay. As a result, most states' socioeconomic and infrastructure conditions have remained suboptimal. While budget deficits are often a red flag for analysts and investors, it is crucial to comprehend the underlying causes of deficits in any nation or state.

With the expectation that rising global crude oil prices would increase Nigeria's revenues, there was hope that this would lead to better infrastructure development and a reduction in the fiscal deficit. However, despite global oil price increases, Nigeria's fiscal deficit has continued to rise. This persistent fiscal imbalance limits the government's ability to meet the growing infrastructure demands of its population. Nigeria's infrastructure development remains lagging compared to other lower-middle-income countries such as Pakistan, India, and Indonesia [2, 5].

The importance of studying the effects of fiscal deficits on infrastructure development in nations like Nigeria cannot be overstated. An increasing fiscal deficit may constrain government investment in essential infrastructure, thus hindering national development. On the other hand, a well-managed fiscal deficit could open the door to more investment in infrastructure, driving economic growth and creating jobs. Grasping the link between fiscal deficits and infrastructure development is important for shaping policies that promote sustainable growth [1].

Looking ahead, Nigeria's demand for infrastructure will continue to rise, particularly with a projected population growth of more than 60 % over the next 20 years, from over 200 million people to virtually 330 million by 2040. This will position Nigeria as the fourth most populous nation globally, behind the United States, China, and India. Without substantial infrastructural investments, the country's fiscal deficit and infrastructure challenges will likely worsen [2].

While extensive research has explored the effect of fiscal deficits on economic growth, particularly in developing nations, there remains a significant void in the literature concerning the direct influence of fiscal deficits on infrastructure development. Some studies suggest that fiscal deficits hinder economic growth, especially when associated with inefficient spending and fiscal irresponsibility [6–8], while others argue that fiscal deficits can stimulate growth when directed towards productive infrastructure investments [9–13]. This discrepancy in findings may stem from differences in research methodologies and the varying fiscal

contexts across countries. Despite these differences, a significant gap remains in understanding how fiscal deficits directly influence infrastructure development, especially in emerging economies like Nigeria.

The study's novelty stems from its specific focus on the direct impact of fiscal deficits on infrastructure development, specifically in the Nigerian context. While previous research has explored the broader link between fiscal deficits and economic growth, a significant gap exists in investigating how fiscal deficits directly affect infrastructure development. To the researcher's knowledge, no study has empirically examined this relationship for Nigeria, especially over the long term (1986–2021), a period that spans both military and civilian governments. This study, therefore, offers fresh perspectives on the complex dynamics between fiscal policy and infrastructural development, filling a critical void in the previous research.

To address this gap, the study will investigate the link between fiscal deficits and infrastructure development in Nigeria from 1986 to 2021, covering both military and democratic governments. This period is significant as it provides a comprehensive view of Nigeria's infrastructure development efforts through different political phases. By examining both military (13 years) and civilian (22 years) rule, the study will offer a nuanced understanding of how fiscal deficits have influenced infrastructure development in Nigeria over time.

The study uses physical and economic infrastructure indices to explore the extent to which fiscal deficits have impacted Nigeria's infrastructure development during this period. By addressing this broad objective, the study employs an Autoregressive Distributed Lag (ARDL) model and seeks to provide empirical evidence on the influence of overall fiscal deficits on infrastructure development in Nigeria, both short and long term and offer valuable insights for policymakers aiming to address Nigeria's infrastructure challenges in the future.

The study will address the following research questions (RQ).

RQ1: Does the fiscal deficit impact social infrastructure in Nigeria?

RQ2: Does the fiscal deficit impact economic infrastructure in Nigeria?

The main purpose of this study is to assess the relationship between fiscal deficits and Nigeria's infrastructure development, specifically focusing on both social infrastructure (such as education and healthcare) and economic infrastructure (including transportation, communication, and energy). The study aims to provide empirical evidence on how fiscal deficits impact infrastructure development in the short run and long run, and to offer valuable insights for policymakers working to address Nigeria's infrastructure challenges.

The hypothesis of this study is that fiscal deficits have significant effects on infrastructure development, with short-term effects being pronounced than the long-term effects.

The study will test the following *null hypotheses:*

H01: Overall fiscal deficits have no effect on social infrastructure.

H02: Overall fiscal deficits have no effect on economic infrastructure.

The structure of the paper. The literature is thoroughly reviewed in Section 2. The research materials and methods are in Section 3. Sections 4 and 5 are the results and discussion of findings.

2. Literature Review

2.1. Theoretical Review

Fiscal deficits linked to infrastructural development can be explored through various interconnected theoretical reviews. The Keynesian perspective postulates that government expenditure can stimulate economic growth by increasing aggregate demand. As the money supply increases, lending rates decrease, encouraging private-sector investment. This investment growth, driven by the Keynesian multiplier effect, leads to an increase in output capacity.

However, the theory acknowledges the potential drawbacks, such as crowding out of private investment because of higher government borrowing, especially when the local economy struggles to absorb increased government spending. This can result in a trade deficit due to higher imports and a potential exchange rate depreciation, often called the "twin-deficits" phenomenon [14, 15].

Complementing this, the Golden Rule of Public Finance (GRPF) also permits governments to incur a budgetary deficit if the funds are directed toward profitable and productive investment projects. According to the GRPF, a deficit budget is justifiable if it finances projects with the potential for future economic expansion. However, this strategy's long-term success depends on existing debt levels, as a high debt burden can undermine the growth benefits of deficit financing [16].

Furthermore, unlike other theories, the notion of endogenous growth highlights the role of internal factors within the economic system, with government policies assessing how budget deficits affect growth [17]. Public investments in physical assets, human capital, science, and technology positively impact output and contribute to long-term growth. Albert Hirschman's Unbalanced Growth Theory offers a strategic approach for developing countries with limited resources. The theory advocates for targeted investments in specific sectors. Hirschman distinguished between divergent investments, which generate more external economies than they capture, and convergent investments, which capture more than they generate. He advocated a deliberate strategy to unbalance the economy, focusing on investments and emphasising the importance of social overhead capital (SOC), such as power, transportation, communications, energy, education, and health, as it facilitates productive investment. These theories offer insights into how fiscal deficits and infrastructure development can be managed to promote Nigeria's sustainable growth.

2.2. Empirical Review

Fiscal deficits and infrastructure development linkage is complex and multifaceted, with scholars offering diverse perspectives on the effects of fiscal policy on economic growth and infrastructure. Fiscal deficits, while often used as tools

for stimulating growth, can have both positive and detrimental impacts depending on how the deficits are financed, managed, and spent. This review explores key empirical research that examines the influence of fiscal deficits on infrastructure development, providing insights into the nuances of this relationship in various countries, including Nigeria.

Buthelezi & Nyatanga [10] explore the complex relationship between government debt, fiscal consolidation, and economic growth in South Africa. Applying a dynamic threshold model, they identify a nonlinear relationship, showing that while high debt levels can hinder economic performance, moderate debt, particularly around 29–30 % of GDP, can stimulate growth. However, when debt exceeds 60 %, fiscal consolidation, particularly via tax increases or expenditure cuts, becomes counterproductive, yielding negative effects on GDP per capita. Their findings emphasise the importance of avoiding excessive fiscal tightening at high debt levels and instead promoting productive investment strategies to support sustainable growth.

Timilsina et al. [18] expand the understanding of fiscal policy's effects on infrastructure, analysing data from 87 countries. Their study reveals that infrastructure investments, particularly in energy and telecommunications, have a substantial positive long-term impact on GDP, even if the short-term returns on transportation infrastructure (such as roads and rail) are less pronounced. This suggests that targeted infrastructure investments can provide sustained long-term economic growth.

However, the literature presents contrasting views. Ravinthirakumaran & Kesavarajah [8] examined fiscal deficits and economic growth across several South Asian nations, finding a generally negative relationship, except in Nepal, where fiscal deficits seemed to drive economic growth. This mixed result reflects the context-dependent nature of fiscal policy outcomes.

Awan & Anum [19] focus on Pakistan, where a positive link exists between economic growth and physical infrastructure, particularly in sectors like roads and electricity. This reinforces the argument that infrastructure development is a vital force behind economic expansion.

Conversely, Goher et al. [6] caution that fiscal irresponsibility, particularly excessive reliance on fiscal deficits, undermines infrastructure development, citing negative long-term effects of fiscal mismanagement in Pakistan.

In Nigeria, Chinyere [11] examined the connection between Nigeria's economic expansion and budget imbalance. The study used an ECM, Johansen co-integration analysis, unit root tests, and diagnostic checks on time series data. Interest rates, total federal collection revenue, and public external debt were found to be the main drivers of economic growth. Exchange rate, real GDP, and government expenditure impacted public deficit financing. The suggested ECM model clarified how much fiscal deficit shocks impact economic growth over time. The report recommended that the government prioritise capital expenditures, prioritise budget implementation, and concentrate on measures promoting economic growth.

Similarly, Nwamuo [7] suggests that fiscal deficits have negative long-term effects in Nigeria, but non-oil revenue has a positive impact. This underscores the

need for effective management of fiscal deficits by diversifying revenue sources, especially through non-oil income.

Olubunmi [9] and Ubi & Inyang [1] echo the importance of capital expenditure in Nigeria. They find that while recurrent expenditures hinder short-term growth, focusing fiscal policy on infrastructure investment can result in higher long-term economic growth. Olubunmi [9] suggests that fiscal adjustments, especially those focused on increasing government revenue and managing capital expenditure, could help reduce Nigeria's fiscal deficit and boost long-term growth. Ubi & Inyang [1] add that fiscal deficits can positively influence economic growth, but only when directed towards capital spending, which is critical for infrastructure development.

Owolabi-Merus [20] explores the infrastructure development and economic growth nexus in Nigeria, finding that infrastructure significantly contributes to economic expansion. However, the Granger causality test indicated no reciprocal nexus between infrastructure and growth during the period studied, suggesting that while infrastructure investments are essential, their full potential is not being realised due to other systemic issues.

Maji & Achegbulu [12] examine how fiscal deficits affect Nigeria's economic growth and find that while growth is positively impacted by budgetary deficits, monetary policies must be aligned to prevent inflationary pressures that could offset these benefits.

The empirical literature underscores the dual nature of fiscal deficits in promoting or hindering infrastructure development and economic growth. While many studies suggest that fiscal deficits can stimulate growth when directed towards productive infrastructure investments, others caution against the risks of excessive recurrent spending, which can undermine long-term growth prospects.

A key takeaway is that the nexus between fiscal deficits and infrastructure development is not linear, and effective management, strategic allocation of resources, and a focus on capital expenditures are essential for maximising the benefits of fiscal deficits.

Based on the gaps identified in the literature and the findings of previous studies, the following null hypotheses are proposed: *H01*: Fiscal deficits have no significant impact on social infrastructure (education and healthcare); *H02*: Fiscal deficits have no significant impact on economic infrastructure (transportation, energy, communication).

This study addresses a critical void in the existing research by specifically investigating the effects of fiscal deficits on infrastructure development in Nigeria. Although previous research has explored the broader fiscal deficits and economic growth relationship, none have focused specifically on addressing the overall fiscal deficits and their relationship with social and economic infrastructure in Nigeria. By filling this gap, the study aims to provide empirical evidence that can inform fiscal policy and infrastructure development strategies in Nigeria, ultimately contributing to sustainable economic progress.

3. Materials and Methods

3.1. Data and Description of Variables

The annual dataset from 1986 to 2021, obtainable from Nigeria's Central Bank (CBN) Annual Statistical Bulletin and World Bank, Development Indicators (WDI), is employed to examine the fiscal deficits, economic and social infrastructure nexus in Nigeria. The dependent variable is the overall fiscal deficit (OFD), which represents the variance between government expenditure and revenue, leading to borrowing when there is a deficit. This is crucial for understanding the government's fiscal health and its ability to invest in development [21].

The independent variables include:

1. Access to Electricity (ATE) measures the percentage of the population with access to electricity, an essential indicator of infrastructure development and quality of life [22].
2. Computer, Communications, and Other Services (COMM) measures the share of commercial service exports related to technology and communications [23].
3. Air Transport, Freight (AIRTRA) measures the volume of air freight, indicating the role of air transport in international trade [19]. High air freight volumes suggest strong infrastructure development.
4. Air Transport, Passengers Carried (TRA) reflects air travel volume, which correlates with business and tourism activity [18].
5. Government Spending on Education (EDU) indicates the resources allocated to education, which are vital for human capital development and broader economic growth [24].
6. Government Health Expenditure (GHE) measures the funds allocated to healthcare services and reflects public investment in health infrastructure, which can improve productivity and long-term growth [25].

The variables overview is described in Table 1.

Table 1. **Variables, Sources, and Description**

Variable/code	Measurement	Data Source	Expected Sign
Dependent			
Overall Fiscal Deficit (OFD)	₦'b (Naira in billions % of GDP)	CBN	
Independent			
Access to electricity (ATE)	% of population	WDI	+
Computer, communications and other services (COMM)	% of commercial service exports	WDI	+
Air transport, passengers carried (TRA)	Passenger traffic (in millions)	WDI	+
Air transport, freight (AIRTRA)	million ton-km	WDI	+
Government Spending on Education (EDU)	₦'b	CBN	+
Government Health Expenditure (GHE)	₦'b	CBN	+

3.2. Model and Estimation Methods

This study draws on various theoretical frameworks, and in particular, the Solow [26] which posits that technological progress drives economic growth by enhancing productivity, and it is highlighted by Anderu & Omotayo [27] and Tanzi & Zee [28]. This theory argues that labour (L), capital (K), and technology (T) all affect production. Building on these frameworks, the model in this study adapts the basic production function to focus on fiscal deficits and infrastructure development, particularly in Nigeria.

The model's standard form is:

$$Y = f(K, L, T), \tag{1}$$

where Y denotes total output, K represents capital stock, L signifies labour, and T signifies technological index. To apply this model to Nigeria's fiscal deficit, economic and social infrastructure, we modify Equation (1) to incorporate key explanatory variables:

$$OFD = f(Infrastructural\ development). \tag{2}$$

This is further broken down as:

$$OFD = f(SINFR, EINFR), \tag{3}$$

where *OFD* is the overall fiscal deficit, *SINFR* is social infrastructure, and *EINFR* is economic infrastructure. The model is refined further as:

$$OFD = f(ATE, COMM, TRA, AITRA, EDU, GHE), \tag{4}$$

where *OFD* represents the overall fiscal deficit incurred by the government in financing infrastructural projects, *ATE* is access to electricity, *COMM* represents computer, communications, and other services, *TRA* refers to air transport, specifically passengers carried, *AITRA* denotes air transport, freight (million ton-km), *EDU* and *GHE* represent government spending on education and health, respectively.

For statistical analysis, we log-transform Equation (4) as follows:

$$OFD = f(ATE, COMM, AITRA, LTRA, LEDU, LGHE), \tag{5}$$

Where: *LTRA* is the log of air transport, passengers carried; *LEDU* and *LGHE* denote logarithms of government spending on education and health, respectively.

Equation (5) is incomplete without the constant term, which is included in the modified version, Equation (6):

$$\begin{aligned} OFD_t = \beta_0 + \beta_1 ATE_t + \beta_2 COMM_t + \beta_3 AITRA_t + \\ + \beta_4 LTRA_t + \beta_5 LEDU_t + \beta_6 LGHE_t + \mu_t, \end{aligned} \tag{6}$$

Where: OFD_t is the overall fiscal deficit at time t; ATE_t *is a*ccess to electricity at time t; $COMM_t$ is computer, communications and other services at time t; $AITRA_t$

is air transport, freight at time *t*; $LEDU_t$ is log of air transport, passengers carried at time *t*; $LGHE_t$ *is l*og of government spending on education at time *t*; β_0, β_1, β_2, β_3, β_4, β_5, β_6 are the explanatory variable coefficients; μ_t is the error term at time *t*.

The estimation process includes pre-estimation tests, estimation techniques, and post-estimation analyses. The primary technique employed is the ARDL model, which is highly effective for analysing both short- and long-term variable relationships [22]. The ARDL model incorporates lagged values, providing deeper insights into the dynamic interplay between fiscal deficits and infrastructure.

The short-run model is specified as:

$$\Delta OFD_t = \beta_0 + \sum_{n=1}^{a} \delta_1 \Delta OFD_{t-n} + \sum_{m=1}^{b} \delta_2 \Delta ATE_{t-m} + \sum_{m=1}^{b} \delta_3 \Delta COMM_{t-m} + \\ + \sum_{m=1}^{b} \delta_4 \Delta AITRA_{t-m} + \sum_{m=1}^{b} \delta_5 \Delta LTRA_{t-m} + \sum_{m=1}^{b} \delta_6 \Delta LEDU_{t-m} + \\ + \sum_{m=1}^{b} \delta_7 \Delta LGHE_{t-m} + \lambda ECT_{t-1} + \mu_t. \quad (7)$$

Where: λECT_{t-1} — error correction term at time *t*-1; Δ — change of each variable; λ — error correction coefficient, reflecting adjustment rate toward equilibrium.

In the following, Equation 8 long-run model is specified as:

$$OFD_t = \beta_0 + \beta_1 ATE_{t-1} + \beta_2 COMM_{t-1} + \beta_3 AITRA_{t-1} + \beta_4 LTRA_{t-1} + \\ + \beta_5 LEDU_{t-1} + \beta_6 LGHE_{t-1} + \sum_{n=1}^{a} \delta_1 OFD_{t-n} + \sum_{m=1}^{b} \delta_2 ATE_{t-m} + \\ + \sum_{m=1}^{b} \delta_3 COMM_{t-m} + \sum_{m=1}^{b} \delta_4 AITRA_{t-m} + \sum_{m=1}^{b} \delta_5 LTRA_{t-m} + \\ + \sum_{m=1}^{b} \delta_6 LEDU_{t-m} + \sum_{m=1}^{b} \delta_7 LGHE_{t-m} + \lambda ECT_{t-1} + \mu_t. \quad (8)$$

These models enable a thorough examination of the short and long-term dynamics between fiscal deficits and infrastructure development.

4. Results

The empirical estimation of the fiscal deficit's impact on infrastructural development in Nigeria involves a comprehensive examination that includes several critical steps, like pre-estimation tests, ARDL model estimation, post-diagnostic tests, and a discussion of findings.

4.1. Summary Statistics

Table 2 explains the descriptive statistics for the data from 1986 to 2021, covering an observation period of 36 years. The mean for OFD is 0.701509, with a minimum of –2.676702, a maximum of 5.995394, and a median of 0.323862. The standard deviation for OFD deviates from the mean — 2.146646. The skewness

Table 2. **Summary statistics of data from 1986–2021**

Variables	OFD	ATE	AIRTRA	COMM	LTRA	LEDU	LGHE
Mean	0.701509	45.05260	12.56745	42.29549	6.129282	1.605185	1.262131
Median	0.323862	46.45342	10.01250	29.72448	6.057139	1.894812	1.571391
Maximum	5.995394	59.50000	37.20000	95.96457	6.891322	2.810735	2.626679
Minimum	–2.676702	27.30000	0.000000	–2.13E-13	5.344785	–0.647807	–1.383897
Std.Dev.	2.146646	9.862929	10.10609	38.88678	0.443150	1.030128	1.150623
Skewness	0.750014	–0.476086	0.745462	0.110869	0.156705	–0.781544	–0.670954
Kurtosis	3.220682	2.173978	2.569346	1.117804	1.701089	2.534114	2.275851
Jarque-Bera	3.448176	2.383412	3.612479	5.387744	2.678095	3.990440	3.487660
Probability	0.178336	0.303703	0.164271	0.067619	0.262095	0.135984	0.174849
Sum	25.25433	1621.894	452.4283	1522.638	220.6541	57.78665	45.43671
SumSq.Dev.	161.2832	3404.708	3574.660	52926.35	6.873376	37.14075	46.33770
Observations	36	36	36	36	36	36	36

of OFD is 0.750014, indicating a normal skewness and symmetry around the mean. However, the kurtosis value is 3.220682, which is leptokurtic, suggesting that the variable has higher values above its mean. The Jarque-Bera statistic for OFD is 0.178336, greater than the 0.05 threshold, indicating that the series is normally distributed.

The ATE variable has an average value of 45.05260. Its range spans from a minimum of 27.30000 to 59.50000, with a median of 46.45342. The standard deviation is 9.862929. The skewness of ATE is –0.476086, indicating a negative skew with a long-left tail. Its kurtosis value is 2.173978, which is platykurtic, signifying a flattened distribution. The Jarque-Bera statistic confirms that ATE has a normal distribution. For AIRTRA, the average value is 12.56745, ranging from 0.000000 to 37.20000 and a median of 10.01250. The standard deviation is 10.10609. AIRTRA exhibits a skewness of 0.745462, indicating normal skewness and symmetry around the mean. Its kurtosis is 2.569346, which is platykurtic and suggests a flattened distribution. The Jarque-Bera value of 0.164271 > 0.05 indicates a normally distributed curve.

The COMM has an average value of 42.29549, ranging from –2.13E-13 to 95.96457 and a median of 29.72448. The standard deviation is 38.88678. The skewness is 0.110869, indicating normal skewness and symmetry around the mean. Its kurtosis value is 1.117804, which is platykurtic, suggesting a flattened distribution. The Jarque-Bera value of 0.067619> 0.05, confirms that the COMM series is normally distributed. The LTRA variable averages 6.129282, with values ranging from 5.344785 to 6.891322 and a median of 6.057139. The standard deviation is 0.443150. The skewness is 0.156705, indicating normal skewness and

symmetry. Its kurtosis value of 1.701089 is platykurtic, indicating a flattened distribution. The Jarque-Bera value of 0.262095, exceeding 0.05, confirms that LTRA series has a normally distributed curve.

The mean value for LEDU is 1.605185, with a minimum of –0.647807, a maximum of 2.810735, and a median of 1.894812. LEDU has a standard deviation of 1.030128 and a negative skewness of –0.781544, indicating a long-left tail, as the skewness is less than the sampled mean. The kurtosis value 2.534114 is platykurtic, suggesting a flattened curve since it is less than 3. The Jarque-Bera test shows a value of 0.135984, indicating that the LEDU series follows a normal distribution. Similarly, LGHE has a mean value of 1.262131 over the same 36-year period, with a minimum of –1.383897, a maximum of 2.626679, and a median of 1.571391. The standard deviation is 1.150623, and the skewness is –0.670954, indicating a long-left tail relative to the sampled mean. The kurtosis, at 2.275851, is platykurtic and suggests a flattened curve. The Jarque-Bera test for LGHE is 3.487660 and p-value of 0.174849, further indicating that the LGHE series follows a normal distribution.

4.2. Correlation

Establishing whether a meaningful link exists among the variables is necessary. Therefore, Table 3 displays the variables' probability values, t-statistics, and correlation.

Table 3. **Correlation of data series**

Variables	OFD	ATE	AIRTRA	COMM	LTRA	LEDU	LGHE
OFD	1.000000						
	[-----]						
	(-----)						
ATE	–0.136184	1.000000					
	[–0.801552]	[-----]					
	(0.4284)	(-----)					
AIRTRA	–0.225829	–0.467206	1.000000				
	[–1.351714]	[–3.081216]	[-----]				
	(0.1854)	(0.0041)	(-----)				
COMM	0.313855	–0.612246	0.046398	1.000000			
	[1.927465]	[–4.515144]	[0.270836]	[-----]			
	(0.0623)	(0.0001)	(0.7882)	(-----)			

End of table 3

Variables	OFD	ATE	AIRTRA	COMM	LTRA	LEDU	LGHE
LTRA	–0.634399	0.577494	0.028147	–0.823074	1.000000		
	[–4.785413]	[4.124644]	[0.164188]	[–8.450463]	[-----]		
	(0.0000)	(0.0002)	(0.8706)	(0.0000)	(-----)		
LEDU	–0.114871	0.940855	–0.515593	–0.581021	0.540466	1.000000	
	[–0.674270]	[16.19223]	[–3.508733]	[–4.162618]	[3.745618]	[-----]	
	(0.5047)	(0.0000)	(0.0013)	(0.0002)	(0.0007)	(-----)	
LGHE	–0.142563	0.955888	–0.506000	–0.622342	0.567913	0.993606	1.000000
	[–0.839856]	[18.97564]	–3.420693	–4.636055	4.023229	51.31653	-----
	(0.4069)	(0.0000)	0.0016	0.0001	0.0003	0.0000	-----

Note: [] and () are the t-statistics and probability values, respectively.

Table 4 indicates that COMM positively correlates with OFD. However, ATE, AIRTRA, LTRA, LEDU and LGHE do not correlate with OFD. LTRA was significant at 5 %, while ATE, AIRTRA, COMM, LEDU and LGHE were insignificant at 5 %.

4.3. Optimal Lag Length Selection

Given that the data series is annual, a small number of lags, typically 1 or 2, is usually sufficient. Choosing the correct lag length is important to prevent serial correlation, multicollinearity, and model misspecification. A common practice, as suggested by Shrestha & Bhatta [29] is to choose the model with the lowest value according to criteria such as Schwarz Criterion (SC), Akaike Information Criterion (AIC), or Hannan-Quinn Criterion (HQ). Table 4 presents the outcomes of the chosen lag order.

To determine the chosen lag order criteria, the endogenous variables considered are OFD, ATE, AIRTRA, COMM, LTRA, LEDU, and LGHE, while the exogenous variable is the constant. According to the rule of thumb, the model should adopt the criterion with the lowest value among the AIC, SIC, and HQ.

Table 4. **Results of the Lag Order Selection Criteria**

Lag	LogL	LR	FPE	AIC	SC	HQ
0	–430.3437	NA	351.1031	25.72610	26.04035	25.83327
1	–307.4556	187.9465*	4.842817*	21.37974	23.89375*	22.23709*
2	–252.1800	61.77866	4.956232	21.01059*	25.72435	22.61811

Note: * denotes lag order chosen by the criterion.

In this study, the AIC, with a value of 21.01059, suggests an optimal lag length of two (2) periods, as supported by the SIC, HQIC, and Final Prediction Error (FPE) criteria, except for the Likelihood Ratio (LR) test. Therefore, the model uses the lag length of two, as determined by the AIC, for both the unit root test and model estimation, as presented in Table 4.

4.4. Unit Root Test

The Augmented Dickey-Fuller (ADF) test was utilised to evaluate data stationarity and to avoid erroneous or misleading results [30]. In Table 5, the variables OFD, ATE, AITRA, LTRA, LEDU, and LGHE are stationary at the first difference (I(1)), while COMM is stationary at levels (I(0)). The mixed stationarity suggests that the data requires a specific approach for analysis.

As a result, the null hypothesis (Ho) of non-stationarity is accepted for OFD, ATE, AITRA, LTRA, LEDU, and LGHE at the first difference but rejected for COMM at levels. The presence of mixed stationarity necessitates using the ARDL model for estimation.

Table 5. **ADF Unit Root Test**

Variables	Test form	ADF Statistics	Test Critical value at 5 %	Probability	Order of Integration	Remarks
OFD	Level First difference	–1.865636 –5.890674	–3.544284 –3.548490	0.6507 0.0001	I(0) I(1)	Non-stationary Stationary
ATE	Level First difference	–2.410957 –5.638856	–3.548490 –3.557759	0.3677 0.0003	I(0) I(1)	Non-stationary Stationary
AIRTRA	Level First difference	–2.934571 –6.867120	–3.544284 –3.548490	0.1646 0.0000	I(0) I(1)	Non-stationary Stationary
COMM	Level First difference	–3.880841 -----	–3.544284 -----	0.0237 -----	I(0) -----	Stationary -----
LTRA	Level First difference	–2.573953 –5.464948	–3.544284 –3.548490	0.2936 0.0004	I(0) I(1)	Non-stationary Stationary
LEDU	Level First difference	–3.354066 –6.138559	–3.544284 –3.557759	0.0743 0.0001	I(0) I(1)	Non-stationary Stationary
LGHE	Level First difference	–2.550859 –5.612357	–3.548490 –3.557759	0.3036 0.0003	I(0) I(1)	Non-stationary Stationary

Furthermore, since the ADF test results indicate mixed stationarity, performing a cointegration test using the ARDL Bounds test to establish cointegration between the dependent and independent variables is essential, ensuring appropriate model estimation.

4.5. Cointegration Test

To test for cointegration [31]. The hypothesis must be stated: H_0: No cointegration relationship exists between the variables. This is specified as:

$$H0 = \beta1 = \beta2 = \beta3 = \beta4 = 0. \quad (9)$$

It should be highlighted, therefore, that the ARDL bound test indicates no co-integration among the variables in equation (9).

Alternate hypothesis (H_1): The independent and dependent variables have a cointegration relationship. This is specified as:

$$H0 = \beta1 \neq \beta2 \neq \beta3 \neq \beta4 \neq 0. \quad (10)$$

Nevertheless, it should be mentioned that, according to the ARDL bound test, equation (10), as specified, suggests that the variables are co-integrated.

In the cointegration test in Table 6, the F-statistic is 3.876491, while Table 7's bound F-statistic (3.876491) indicates that Ho of no cointegration is rejected at the 5 % level.

Meaning there is a stable, long-term equilibrium relationship between fiscal deficit and infrastructure. Therefore, using the ECM to address any disequilibrium in the variables is necessary in the long run by adjusting for short-term shocks [32].

Table 6. **ARDL Bound Test**

Test Statistic	Value	k = (N-1)
F-statistic	3.876491	6

Table 7. **Critical Value Bounds Results**

Significance	I0 Bound (Lower Bound)	I1 Bound (Upper Bound)
10 %	1.99	2.94
5 %	2.27	3.28
2.5 %	2.55	3.61
1 %	2.88	3.99

4.6. ARDL Model Estimation

The ADF unit root test results showed stationary and non-stationary mix of variables, indicating a potential long-run cointegration. This observation led to selecting the ECM (Table 8), effectively addressing short-term deviations and ensuring a consistent long-run equilibrium, as Engle & Granger [33] described. The significance of the ECT is crucial for validating the model, as it reflects the speed at which adjustments are made to return to the long-run equilibrium.

The ECT coefficient is –0.639887, indicating that 63.99 % of the model's disequilibrium is corrected annually in the short run to restore long-run equilibrium. This suggests that the model adjusts to equilibrium at a speed of 63.99 % after the sampled period ends in 2022. The R-squared value (68.33 %) indicates that the independent variables account for the variation in the dependent variable in the short run. In comparison, the remaining 31.67 % is due to other factors not captured in the short-run ECM.

Nonetheless, the ARDL model evaluates the variables' long-term relationship, using OFD as a proxy for the overall fiscal deficit. An optimal lag selection process was conducted using a series generation technique, transitioning from a general to a specific approach, as described by Pesaran et al. [34]. The ARDL estimate is chosen for its ability to identify the ideal lag structure and accommodate different optimal lag lengths [35, 36], making it well-suited for analysing long-term relationships with variables that have varying orders of integration. The AIC criterion selected two maximum dependent lags and two automatics dynamic regressors.

Table 8. **ECM Results**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ATE)	–0.068816	0.058278	–1.180822	0.2530
D(ATE(–1))	–0.154285	0.058977	–2.616014	0.0175
D(AIRTRA)	–0.059294	0.020757	–2.856608	0.0105
D(AIRTRA(–1))	0.082433	0.026016	3.168613	0.0053
D(LTRA)	–2.208270	1.075723	–2.052824	0.0549
D(LTRA(–1))	3.588066	1.201073	2.987383	0.0079
D(LGHE)	–8.988090	1.268444	–7.085918	0.0000
D(LGHE(–1))	–1.979510	0.528111	–3.748285	0.0015
*ECT/Coint. Eq. (–1)**	–0.639887	0.097500	–6.562935	0.0000
R-squared	0.683290	Adjusted R-squared		0.581943
S.E. of regression	0.887388	Durbin-Watson stat.		1.892089

Hence, the selected model for the OFD lagged by one period, electricity (ATE), air transport (AIRTRA), air transport passengers (LTRA), government health expenditure (LGHE) lagged by two periods, while the share of computers, communications, and other services in commercial service exports (COMM) and education expenditure log (LEDU) were not lagged (that is, ARDL: 1, 2, 2, 0, 2, 0, 2) (Table 9).

Since the model adopts the selected model of the 1, 1, 2, 0, 2, 1 and 2 model, it can be estimated below:

$$\begin{aligned} OFD_t = {} & 11.52979 - 0.360113\, OFD_{t-1} + 0.154285\, ATE_{t-1} - \\ & - 0.082433\, AIRTRA_{t-2} - 0.013742\, COMM_t - 3.588066\, LTRA_{t-2} + \\ & + 6.993894\, LEDU_t + 1.979510\, LGHE_{t-2} + \varepsilon_t. \end{aligned} \quad (11)$$

The long-run relationship estimates show that electricity (ATE) positively affects the fiscal deficit, but is insignificant at the 5 % level. Conversely, air transport (AIRTRA) negatively impacts the fiscal deficit, which is significant at 5 %.

Table 1. **ARDL Long-run Relationship Results**

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
OFD(–1)	0.360113	0.154580	2.329616	0.0317
ATE	–0.068816	0.095887	–0.717671	0.4822
ATE(–1)	0.016153	0.083275	0.193969	0.8484
ATE(–2)	0.154285	0.095020	1.623714	0.1218
AIRTRA	–0.059294	0.029222	–2.029106	0.0575
AIRTRA(–1)	0.041111	0.033418	1.230215	0.2345
AIRTRA(–2)	–0.082433	0.033722	–2.444509	0.0250
COMM	–0.013742	0.011673	–1.177262	0.2544
LTRA	–2.208270	1.610262	–1.371373	0.1871
LTRA(–1)	3.421798	1.978163	1.729786	0.1008
LTRA(–2)	–3.588066	1.501725	–2.389296	0.0280
LEDU	6.993894	2.386691	2.930372	0.0089
LGHE	–8.988090	2.634062	–3.412254	0.0031
LGHE(–1)	–0.777250	0.755047	–1.029407	0.3169
LGHE(–2)	1.979510	0.797769	2.481307	0.0232
C	11.52979	8.260268	1.395813	0.1798
R-squared	0.877478	Prob. (F-statistic)		0.000022
Adjusted R-squared	0.775377	Log-likelihood		–38.95460

Similarly, the share of computers, communications, and other services in commercial service exports (COMM) negatively affects the fiscal deficit but is insignificant at 5 %. The log of air transport passengers (LTRA) also harms the fiscal deficit, with significance at the 5 % level. The education expenditure log (LEDU) positively influences the fiscal deficit and is 5 %significant, as is the government health expenditure log (LGHE).

As presented in Table 9, an R-squared value of 87.75 % suggests that the explanatory variables account for the variation in the fiscal deficit over the long term, with the remaining 12.25 % due to factors not captured by the ARDL model. The model is supported by an F-statistic of 8.594192 and a p-value of 0.000022, indicating a robust linear relationship between fiscal deficit and infrastructural development in Nigeria.

5. Discussion

The study assessed the relationship between fiscal deficits and infrastructural development in Nigeria, focusing on social and economic infrastructure. The short and long-run findings offer crucial insights into how fiscal deficits affect infrastructural development and vice versa.

The short-run results indicate that electricity (ATE) significantly negatively affects the fiscal deficit, which aligns with the hypothesis that infrastructure investments can increase fiscal pressures in the short term. The notable short-term link between electricity access (ATE) and the fiscal deficit is a result that is consistent with the research hypothesis that infrastructure development can exacerbate fiscal imbalances.

In contrast, the long-run estimates reveal that electricity (ATE) has a positive but statistically insignificant effect on the fiscal deficit, implying that in the long term, the effects of electricity infrastructure expansion do not significantly affect the fiscal deficit. These findings partially negate the work of Timilsina et al. [18], but align with findings by Owusu-Manu [37] in Ghana, where the long-term impact of electricity infrastructure did not significantly affect fiscal deficits.

Regarding air transport (AIRTRA), the study finds that, in the short run, air transport positively impacts the fiscal deficit, supporting the hypothesis that infrastructure development in key sectors like transport can directly contribute to higher fiscal imbalances. This result is statistically significant, and it is related to the twin deficits hypothesis and the findings of Awan & Anum [19] on Pakistan, which also showed a similar positive relationship between transport infrastructure and fiscal deficits. In the long run, however, air transport negatively affects the fiscal deficit and remains statistically significant, indicating a consistent long-term impact. This finding reinforces the twin deficit hypothesis, were infrastructure investments, while necessary, can contribute to long-term fiscal pressures.

The log of air transport passengers (LTRA) shows a significant positive effect on fiscal deficits in the short run, supporting the hypothesis that short-term infrastructure expansion in sectors like transport can lead to a rise in fiscal deficits. This result aligns with Hirschman's theory and is consistent with the findings of Timilsina et al. [18], Ogunlana et al. [38], which suggested that targeted investment in sectors like

transport, education and health could lead to higher fiscal deficits and economic expansion. However, in the long run, air transport passengers negatively influence the fiscal deficit and are substantial, demonstrating a persistent long-term relationship where the positive short-term effects of infrastructure investments are eventually offset.

Similarly, government health expenditure (LGHE) significantly affects the fiscal deficit in the short run. The short-term negative relationship supports the hypothesis that social infrastructure, such as healthcare spending, can pressure fiscal balance. However, in the long run, LGHE positively affects the fiscal deficit and is statistically significant, highlighting a shift in its impact over time. These finding aligns with the endogenous growth theory, which advocates for government intervention in areas that foster long-term growth, as well as with the recommendations of Obinabo & Agu [39] for prioritising long-term investments in social infrastructure.

The educational expenditure log (LEDU) also positively affects the fiscal deficit. It is significant in the long run, confirming the hypothesis that education expenditure contributes to an increasing fiscal deficit over time. The findings align with the recommendations of Sanya & Abiola [40], which emphasised the importance of prioritising human capital development in government budgets. This theory posits that government spending can stimulate economic growth, even if it leads to deficits. However, these investments in education and health infrastructure also caution against the crowding-out effects, where increased spending on social infrastructure can strain the fiscal balance.

The social infrastructure (SINFR) proxies, including education expenditure (LEDU) and government health expenditure (LGHE), positively influence the fiscal deficit in the long run and are significant, indicating that social infrastructure contributes to the rising fiscal deficit in Nigeria. Conversely, the short-run results are less consistent. For economic infrastructure (EINFR), the study finds that while electricity (ATE) and of air transport passengers (LTRA) positively affect the fiscal deficit in the short run, air transport (AIRTRA), share of computers, communications, and other services in commercial service exports (COMM), and air transport passengers (LTRA) have an adverse effect in the long run.

This suggests that while infrastructure development in the short run can lead to higher fiscal deficits, over time, the relationship changes, with infrastructure investments potentially leading to efficiency gains that reduce fiscal pressures. Overall, the findings confirm that fiscal deficits do not significantly impact infrastructure development in Nigeria, both in the short and long run. Thus, the study rejects both $H0_1$ and $H0_2$, as evidence shows that fiscal deficits influence social infrastructure (health and education) and economic infrastructure (electricity and transportation). These insights are crucial for policymakers aiming to manage fiscal deficits while pursuing infrastructure development.

5.1. Limitations of the Study

While this study provides insights, several limitations must be noted. The short-run results are mixed, while they provide some evidence of the relationship

between infrastructure development and fiscal deficits, the findings are not always statistically significant. This suggests further investigation into the temporal dynamics of fiscal policy and infrastructure development. In addition, the study focuses on specific infrastructure areas, such as education, health, transportation, and communication, but excludes other critical sectors like energy, water, and sanitation. The absence of these variables may limit the comprehensiveness of the analysis, particularly regarding the fiscal deficit's overall impact on Nigeria's infrastructure development. Not only that, but it also limits the generalisability of the results, as other infrastructure sectors could exhibit different relationships with fiscal deficits.

Furthermore, the study does not fully account for external shocks, such as global oil price fluctuations, or other macroeconomic factors like exchange rates and inflation. These elements could significantly influence Nigeria's fiscal deficits and infrastructure development, and their omission may affect the robustness of the findings. Lastly, the analysis is confined to Nigeria, without considering the broader regional context of other countries. A cross-country or regional comparison could provide a richer understanding of how fiscal policies impact infrastructure development in different economic contexts. These limitations provide a pathway for future research and a more balanced interpretation of the findings.

5.2. Diagnostic Test

The test for serial correlation, LM (χ^2SC), Breusch-Godfrey yielded a result of 0.518 (0.605), which exceeds the 5 % probability level, indicating no serial correlation issues. Likewise, the test for heteroskedasticity (χ2H), Breusch-Pagan-Godfrey, produced a value of 0.817 (0.503), also above the 5 % probability level, suggesting the lack of heteroskedasticity is confirmed. The Ramsey RESET test result is 3.642 (0.073), indicating the model is stable as it exceeds the 0.05 threshold.

In Figure 1, the probability associated with the Jarque-Bera normality test [41] is 0.444183, which exceeds the 0.05 threshold. Hence, the residuals exhibit a normal distribution, rendering the results suitable for meaningful economic interpretation and implications.

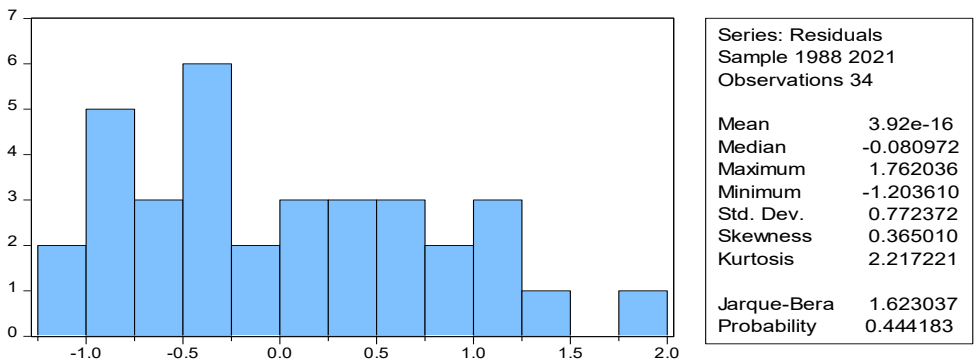

Figure 1. Jarque-Bera Normality Test

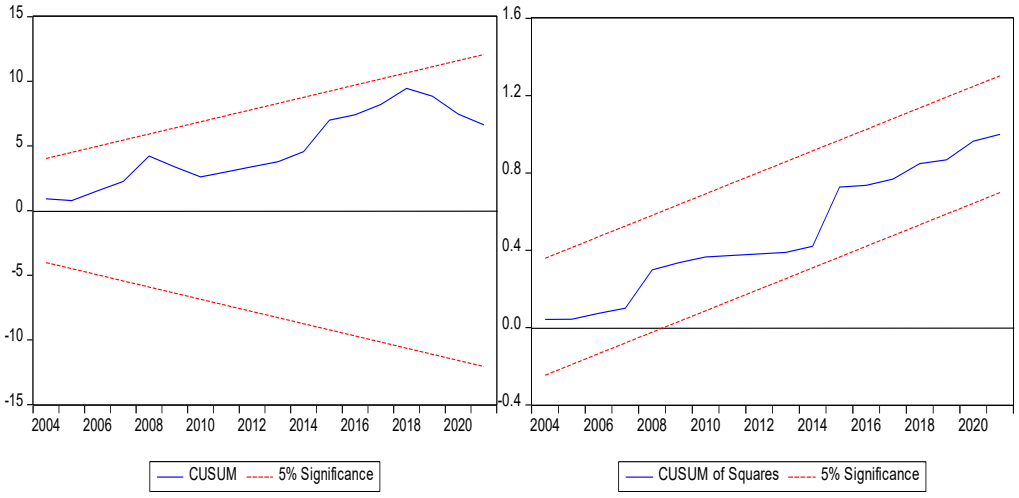

Figure 2. CUSUM and CUSUM of Squares

The test for stability results in Figure 2 shows a boundary lying inside the 5 % significance level of significance using the CUSUM of Squares of the Recursive Estimates. This indicates a stable, suitable, and desirable model for economic interpretation.

6. Conclusion and Recommendations

The study examined the relationship between fiscal deficits and Nigeria's economic and social infrastructural development from 1986 to 2021, using secondary annual data from the World Development Indicators (WDI) and the Central Bank of Nigeria (CBN) Annual Statistical Bulletin. The study employed the Autoregressive Distributed Lag (ARDL) model to analyse the data and assess fiscal deficits' short- and long-term effects on infrastructure development.

The findings reveal an apparent dichotomy between short and long-run effects. In the short run, increases in electricity, air transport, government health expenditure, and air transport passengers negatively impact the fiscal deficit. However, these effects are insignificant, implying that infrastructure development is not the primary driver of the rising deficit. The increase in the fiscal deficit may be attributed to other unexplained factors. In the long run, however, increased education and health expenditures significantly raise the fiscal deficit.

At the same time, an increase in electricity leads to a higher deficit, while increases in air transport, computers, communications, and other services and air transport passengers reduce it. These findings indicate that the fiscal deficit's key drivers are education, health, and electricity.

6.1. Theoretical and Practical Significance

Theoretically, this study contributes to existing literature by enhancing our understanding of the relationship between fiscal deficits and infrastructural development, particularly in a developing economy like Nigeria. The findings support

Keynesian and Endogenous Growth Theories, which advocate for the role of public investment in stimulating long-term economic growth.

However, the study also underscores the caution advised by the Golden Rule of Public Finance (GRPF), which emphasises the need for fiscal deficits to fund productive investments, rather than recurrent expenditure. The results align with Hirschman's Unbalanced Growth Theory, suggesting that targeted infrastructure investments, even if initially deficit-inducing, can eventually foster long-term growth. From a practical standpoint, the findings have significant implications for fiscal policy and infrastructural development in Nigeria.

The study suggests that strategic education, health, and electricity investments are critical for long-term economic expansion. However, it also highlights the potential risks associated with excessive recurrent expenditure, which can undermine long-term fiscal stability. To mitigate these risks, the study recommends that Nigeria leverage its natural resources in petroleum and agriculture to generate revenue and prioritise needs-based expenditure in critical sectors like education, health, transportation, and utilities, which have been shown to impact fiscal deficits significantly in the long run.

6.2. Recommendations

Therefore, the following recommendations addressed Nigeria's fiscal deficit and infrastructure development challenges. The government should leverage natural resources in petroleum and agriculture to generate revenue while prioritising needs-based expenditure in critical sectors like education, health, transportation, and utilities, as these have been shown to impact fiscal deficits significantly in the long term.

This approach should be coupled with rigorous monitoring and evaluation of fund utilisation by Ministries, Departments, and Agencies (MDAs), focusing on anti-corruption measures to ensure effective use of resources. Nigeria's government should adhere to the Golden Rule of Public Finance (GRPF), which supports incurring fiscal deficits only when they fund productive investments. This principle is particularly relevant given the study's findings that certain infrastructure investments, such as access to electricity and air transport, could either raise or lower the long-term budgetary deficit, depending on the nature of the investment.

Infrastructure development should align with population needs rather than political priorities and international standards, such as the World Bank's recommendation of allocating 10 % of the budget to infrastructure annually. Prioritising human capital development through strategic investments in education and health, and adopting a pragmatic approach that directly impacts economic growth, reduces poverty, and creates jobs is crucial.

Nigeria should also expand public-private partnerships (PPPs) to bridge the infrastructure deficit without excessively increasing the fiscal deficit. Given the significant infrastructure needs and limited public funds, this approach would enable more sustainable infrastructure development, aligning with the study's findings on the importance of strategic investments.

References

1. Ubi, P., Inyang, J. (2018). Fiscal deficit and Nigeria's economic development. *International Journal of Economics, Commerce and Management,* Vol. 6, Issue 5, 137–150. Available at: https://ijecm.co.uk/wp-content/uploads/2018/05/6510.pdf

2. Aladejana, S.A., Okeowo, I., Oluwalana, F., Alabi, J. (2021). Debt burden and infrastructural development in Nigeria. *International Journal Academic Research in Business and Social Sciences,* Vol. 11, Issue 1, 419–432. https://doi.org/10.6007/IJARBSS/v11-i1/8518

3. Jeffrey, M.S. (2019). Fiscal policy: Economic effects. *Congressional Research Service,* R45723, 1–15. Available at: https://www.congress.gov/crs-product/R45723

4. Saleh, A.S., Harvie, C. (2005). The Budget Deficit and Economic Performance: A Survey. *The Singapore Economic Review,* Vol. 50, Issue 2, 211–243. https://doi.org/10.1142/s0217590805001986

5. Musa, B.K. (2021). Theoretical review of the impact of fiscal deficits on economic growth in Nigeria. *European Scientific Journal,* Vol. 17, No. 1, 310–334. https://doi.org/10.19044/esj.2021.v17n1p310

6. Goher, F., Ahmed, A., Rehman, W. (2011). Fiscal deficit and economic growth: An analysis of Pakistan's economy. *International Journal of Trade, Economics and Finance,* Vol. 2, No. 6, 501–504. http://dx.doi.org/10.7763/IJTEF.2011.V2.156

7. Nwamuo, C. (2020). Impact of fiscal policy on the economic growth in Nigeria: An empirical analysis. *European Journal of Business and Management,* Vol. 12, No. 12, 37–50. https://doi.org/10.7176/EJBM/12-12-04

8. Ravinthirakumaran, N., Kesavarajah, M. (2016). Causal nexus between fiscal deficit and economic growth: Empirical evidence from South Asia. *International Journal for Innovation Education and Research,* Vol. 4, No. 8, 1–19. https://doi.org/10.31686/ijier.vol4.iss8.575

9. Olubunmi, A.B., John, N.C., Ololade, Y.M., Matthew, S.G. (2019). Fiscal policy and economic growth in Nigeria: An ARDL, Bound test and ECM Approach. *Saudi Journal of Business and Management Studies,* Vol. 4, No. 10, 800–805. https://doi.org/10.36348/SJBMS.2019.v04i10.002

10. Buthelezi, E.M., Nyatanga, P. (2023). The dynamic relationship between government debt, fiscal consolidation, and economic growth in South Africa: A threshold analysis. *Cogent Economics & Finance,* Vol. 11, Issue 2, 2261329. https://doi.org/10.1080/23322039.2023.2261329

11. Chinyere, C.N. (2021). Fiscal deficit and Nigeria economic growth (1990–2020). *International Research Journal of Management, IT and Social Sciences,* Vol. 8, No. 5, 411–433. https://doi.org/10.21744/irjmis.v8n5.1915

12. Maji, A., Achegbulu, J.O. (2012). The impact of fiscal deficits on economic growth in Nigeria. *International Business and Management,* Vol. 4, No. 2, 127–132. https://doi.org/10.3968/j.ibm.1923842820120402.1190

13. Abdullahi, A., Sieng, L.W. (2023). The effect of infrastructure development on economic growth: The case of sub-Saharan Africa. *Journal of Infrastructure, Policy and Development,* Vol. 7, Issue 2, 1–16. https://doi.org/10.24294/jipd.v7i2.1994

14. Monacelli, T., Perotti, R. (2006). Fiscal policy, the real exchange rate and traded goods. *The Economic Journal,* Vol. 120, Issue 544, 437–461. https://doi.org/10.1111/j.1468-0297.2010.02362.x

15. Neaime, S. (2015). Twin deficits and the sustainability of public debt and exchange rate policies in Lebanon. *Research in International Business and Finance,* Vol. 33, 127–143. https://doi.org/10.1016/j.ribaf.2014.09.004

16. Zeyneloglu, I. (2018). Fiscal policy effectiveness and the golden rule of public finance. *Central Bank Review,* Vol. 18, Issue 3, 85–93. https://doi.org/10.1016/j.cbrev.2018.08.001

17. Saleh, A.S. (2004). *Public Sector Deficits and Macroeconomic Performance in Lebanon*. Doctoral dissertation. University of Wollongong, NSW, Australia. Available at: http://ro.uow.edu.au/theses/364

18. Timilsina, G., Stern, D.I., Das, D.K. (2024). Physical infrastructure and economic growth. *Applied Economics,* Vol. 56, Issue 18, 2142–2157. https://doi.org/10.1080/00036846.2023.2184461

19. Awan, A.G., Anum, V. (2014). Impact of infrastructure development on economic growth: A case study of Pakistan. *International Journal of Economics and Sustainable Development,* Vol. 2, No. 5, 1–15. https://doi.org/10.37745/ijdes.13

20. Owolabi-Merus, O. (2015). Infrastructure development and economic growth nexus in Nigeria. *International Journal of Academic Research in Business and Social Sciences,* Vol. 5, No. 1, 376–382. https://doi.org/10.6007/IJARBSS/v5-i1/1439

21. Van, V.B., Sudhipongpracha, T. (2015). Exploring Government Budget Deficit and Economic Growth: Evidence from Vietnam's Economic Miracle. *Asian Affairs: An American Review,* Vol. 42, Issue 3, 127–148. https://doi.org/10.1080/00927678.2015.1048629

22. Gold, K.L., Adetunji, K.O., Yusuf, H.A., Sulaiman, S. (2024). Electricity Production, Consumption, and Manufacturing Sector Performance in Nigeria: A Multi-Decade Analysis. *Journal of Applied Economic Research,* Vol. 23, No. 4, 1077–1098. https://doi.org/10.15826/vestnik.2024.23.4.042

23. Nath, H.K., Liu, L. (2017). Information and communications technology (ICT) and services trade. *Information Economics and Policy,* Vol. 41, 81–87. https://doi.org/10.1016/j.infoecopol.2017.06.003

24. Khusaini, K., Ramdani, H.C., Syamiya, E.N., Aisyah, I. (2022). Does the government expenditure on education and family income boost educational expansion?: Lesson from panel FMOLS. *Review of Applied Socio-Economic Research,* Vol. 24, Issue 2, 89–105. https://doi.org/10.54609/reaser.v24i2.140

25. Qehaja, S.S., Qehaja, D., Arber, H., Marovci, E. (2023). The relationship between government health expenditure and economic growth: Evidence from western Balkan countries. *International Journal of Applied Economics, Finance and Accounting,* Vol. 15, No. 1, 10–20. https://doi.org/10.33094/ijaefa.v15i1.724

26. Solow, R.M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics,* Vol. 70, Issue 1, 65–94. https://doi.org/10.2307/1884513

27. Anderu, K.S., Omotayo, E.O. (2020). Agricultural output and government expenditure in Nigeria. *Jurnal Perspektif Pembiayaan dan Pembangunan Daerah,* Vol. 8, No. 2, 101–110. https://doi.org/10.22437/ppd.v8i2.9106

28. Tanzi, V., Zee, H. (1997). Fiscal Policy and Long-Run Growth. *IMF Staff Papers,* Vol. 44, No. 2, 179–209. https://doi.org/10.5089/9781451947243.024

29. Shrestha, M.B., Bhatta, G.R. (2018). Selecting appropriate methodological framework for time series data analysis. *The Journal of Finance and Data Science,* Vol. 4, Issue 2, 71–89. https://doi.org/10.1016/j.jfds.2017.11.001

30. Gujarati, D.N., Porter, D. (2009). *Basic Econometrics.* 5th Edition. New York, McGraw Hill Inc., 922 p. Available at: https://ucanapplym.s3.ap-south-1.amazonaws.com/RGU/notifications/E_learning/0nline_study/Basic-Econometrics-5th-Ed-Gujarati-and-P.pdf

31. Johansen, S., Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration — with applications to the demand for money. *Oxford Bulletin of Economics and Statistics,* Vol. 52, Issue 2, 169–210. https://doi.org/10.1111/j.1468-0084.1990.mp52002003.x

32. Olawale, A.M., Kehinde, J.E., Gold, K.L., Agboola, Y.H., Adebayo, O.M., Modupe, O. (2023). The nexus between economic growth, institutional quality, and poverty in Nigeria. *Journal of Emerging Economies & Islamic Research,* Vol. 11, No. 3, 94–108. https://doi.org/10.24191/jeeir.v11i3.22417

33. Engle, R.F., Granger, C.W. (1987). Co-integration and error correction: representation, estimation, and testing. *Econometrica,* Vol. 55, No. 2, 251–276. https://doi.org/10.2307/1913236

34. Pesaran, M.H., Shin, Y., Smith, R.J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics,* Vol. 16, Issue 3, 289–326. https://doi.org/10.1002/jae.616

35. Tilahun Mengistu, S. (2022). Does fiscal policy stimulate economic growth in Ethiopia? ARDL approach. *Cogent Economics & Finance,* Vol. 10, Issue 1, 2104779. https://doi.org/10.1080/23322039.2022.2104779

36. Adenomon, M.O., Ojo, R.O. (2020). Autoregressive distributed lag modelling of the effects of some macroeconomic variables on economic growth in Nigeria. *Folia Oeconomica Stetinensia,* Vol. 20, Issue 2, 1–19. https://doi.org/10.2478/foli-2020-0032

37. Owusu-Manu, D.-G., Jehuri, A. B., Edwards, D. J., Boateng, F., Asumadu, G. (2019). The impact of infrastructure development on economic growth in sub-Saharan Africa with special focus on Ghana. *Journal of Financial Management of Property and Construction,* Vol. 24, No. 3, 253–273. https://doi.org/10.1108/JFMPC-09-2018-0050

38. Ogunlana, F.O., Omolara, Y.J., Taiwo, A.B. (2016). Infrastructure finance and development in Nigeria. *Nigerian Chapter of Arabian Journal of Business and Management Review,* Vol. 3, No. 12, 1–11. http://dx.doi.org/10.12816/0027217

39. Obinabo, C.R., Agu, B.O. (2019). Effect of fiscal deficit on selected macroeconomic variables in Nigeria: A time series analysis, 1986–2018. *International Journal of Academic Research in Economics and Management Sciences,* Vol. 8, Issue 2, 68–80. https://doi.org/10.6007/IJAREMS/v8-i2/6276

40. Sanya, O., Abiola, L.N. (2015). Fiscal deficit and economic growth, Nigeria experience. *International Journal for Innovation Education and Research,* Vol. 3, No. 11, 6–15. http://dx.doi.org/10.31686/ijier.vol3.iss11.459

41. Kim, N. (2021). A Jarque-Bera type test for multivariate normality based on second-power skewness and kurtosis. *Communications for Statistical Applications and Methods,* Vol. 28, No. 5, 463–475. https://doi.org/10.29220/csam.2021.28.5.463

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Оценка взаимосвязи между бюджетным дефицитом и экономической и социальной инфраструктурой в Нигерии: данные на основе модели ARDL

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Аннотация. В развивающихся странах, таких как Нигерия, бюджетный дефицит является центральным вопросом в экономическом дискурсе, особенно там, где он пересекается с развитием инфраструктуры. В этом исследовании изучается взаимосвязь между бюджетным дефицитом и развитием инфраструктуры в Нигерии. Особое внимание уделяется как экономической, так и социальной инфраструктуре, с использованием годовых временных рядов данных с 1986 по 2021 год. Целью исследования является изучение того, как бюджетный дефицит влияет на развитие инфраструктуры как в краткосрочной, так и в долгосрочной перспективе, уделяя особое внимание роли государственных расходов и доступа к ключевым инфраструктурным услугам. В исследовании выдвигается гипотеза о том, что бюджетный дефицит усугубляет пробелы в инфраструктуре, особенно в образовании, здравоохранении и транспорте. Используется модель авторегрессионного распределенного лага (ARDL). Результаты показывают, что в краткосрочной перспективе такие переменные, как доступ к электричеству, количество пассажиров на воздушном транспорте, государственные расходы на здравоохранение и грузовые авиаперевозки, оказывают пагубное влияние на бюджетный дефицит, хотя эти эффекты не являются статистически значимыми. С другой стороны, долгосрочные оценки показывают, что увеличение расходов на здравоохранение и образование значительно усугубляет бюджетный дефицит, подчеркивая фискальное бремя инвестиций в социальную инфраструктуру. Исследование показывает, что стратегические инвестиции в образование, здравоохранение и электроэнергетику имеют решающее значение для долгосрочного экономического роста. Тем не менее в нем также подчеркиваются потенциальные риски, связанные с чрезмерными текущими расходами, которые могут подорвать долгосрочную бюджетную стабильность. Теоретические выводы согласуются с кейнсианской и эндогенной теориями роста, в то время как практическое значение заключается в предоставлении политических рекомендаций по стратегическим инвестициям в инфраструктуру для содействия экономическому развитию, повышению социального благосостояния и повышению глобальной конкурентоспособности Нигерии.

Ключевые слова: бюджетный дефицит; развитие инфраструктуры; Нигерия; модель ARDL; образование; здравоохранение.

Список использованных источников

1. *Ubi P., Inyang J.* Fiscal deficit and Nigeria's economic development // International Journal of Economics, Commerce and Management. 2018. Vol. 6, Issue 5. Pp. 137–150. URL: https://ijecm.co.uk/wp-content/uploads/2018/05/6510.pdf

2. *Aladejana S. A., Okeowo I., Oluwalana F., Alabi J.* Debt burden and infrastructural development in Nigeria // International Journal Academic Research in Business and Social Sciences. 2021. Vol. 11, Issue 1. Pp. 419–432. https://doi.org/10.6007/IJARBSS/v11-i1/8518

3. *Jeffrey M. S.* Fiscal policy: Economic effects // Congressional Research Service. 2019. R45723. Pp. 1–15. URL: https://www.congress.gov/crs-product/R45723

4. *Saleh A. S., Harvie C.* The Budget Deficit and Economic Performance: A Survey // The Singapore Economic Review. 2005. Vol. 50, Issue 2. Pp. 211–243. https://doi.org/10.1142/s0217590805001986

5. *Musa B. K.* Theoretical review of the impact of fiscal deficits on economic growth in Nigeria // European Scientific Journal. 2021. Vol. 17, No. 1. Pp. 310–334. https://doi.org/10.19044/esj.2021.v17n1p310

6. *Goher F., Ahmed A., Rehman W.* Fiscal deficit and economic growth: An analysis of Pakistan's economy // International Journal of Trade, Economics and Finance. 2011. Vol. 2, No. 6. Pp. 501–504. http://dx.doi.org/10.7763/IJTEF.2011.V2.156

7. *Nwamuo C.* Impact of fiscal policy on the economic growth in Nigeria: An empirical analysis // European Journal of Business and Management. 2020. Vol. 12, No. 12. Pp. 37–50. https://doi.org/10.7176/EJBM/12-12-04

8. *Ravinthirakumaran N., Kesavarajah M.* Causal nexus between fiscal deficit and economic growth: Empirical evidence from South Asia // International Journal for Innovation Education and Research. 2016. Vol. 4, No. 8. Pp. 1–19. https://doi.org/10.31686/ijier.vol4.iss8.575

9. *Olubunmi A. B., John N. C., Ololade Y. M., Matthew S. G.* Fiscal policy and economic growth in Nigeria: An ARDL, Bound test and ECM Approach // Saudi Journal of Business and Management Studies. 2019. Vol. 4, No. 10. Pp. 800–805. https://doi.org/10.36348/SJBMS.2019.v04i10.002

10. *Buthelezi E. M., Nyatanga P.* The dynamic relationship between government debt, fiscal consolidation, and economic growth in South Africa: A threshold analysis // Cogent Economics & Finance. 2023. Vol. 11, Issue 2. 2261329. https://doi.org/10.1080/23322039.2023.2261329

11. *Chinyere C. N.* Fiscal deficit and Nigeria economic growth (1990–2020) // International Research Journal of Management, IT and Social Sciences. 2021. Vol. 8, No. 5. Pp. 411–433. https://doi.org/10.21744/irjmis.v8n5.1915

12. *Maji A., Achegbulu J. O.* The impact of fiscal deficits on economic growth in Nigeria // International Business and Management. 2012. Vol. 4, No. 2. Pp. 127–132. https://doi.org/10.3968/j.ibm.1923842820120402.1190

13. *Abdullahi A., Sieng L. W.* The effect of infrastructure development on economic growth: The case of sub-Saharan Africa // Journal of Infrastructure, Policy and Development. 2023. Vol. 7, Issue 2. Pp. 1–16. https://doi.org/10.24294/jipd.v7i2.1994

14. *Monacelli T., Perotti R.* Fiscal policy, the real exchange rate and traded goods // The Economic Journal. 2006. Vol. 120, Issue 544. Pp. 437–461. https://doi.org/10.1111/j.1468-0297.2010.02362.x

15. *Neaime S.* Twin deficits and the sustainability of public debt and exchange rate policies in Lebanon // Research in International Business and Finance. 2015. Vol. 33. Pp. 127–143. https://doi.org/10.1016/j.ribaf.2014.09.004

16. *Zeyneloglu I.* Fiscal policy effectiveness and the golden rule of public finance // Central Bank Review. 2018. Vol. 18, Issue 3. Pp. 85–93. https://doi.org/10.1016/j.cbrev.2018.08.001

17. *Saleh A. S.* Public Sector Deficits and Macroeconomic Performance in Lebanon. Doctoral dissertation. University of Wollongong, NSW, Australia, 2004. URL: http://ro.uow.edu.au/theses/364

18. *Timilsina G., Stern D. I., Das D. K.* Physical infrastructure and economic growth // Applied Economics. 2024. Vol. 56, Issue 18. Pp. 2142–2157. https://doi.org/10.1080/00036846.2023.2184461

19. *Awan A. G., Anum V.* Impact of infrastructure development on economic growth: A case study of Pakistan // International Journal of Economics and Sustainable Development. 2014. Vol. 2, No. 5. Pp. 1–15. https://doi.org/10.37745/ijdes.13

20. *Owolabi-Merus O.* Infrastructure development and economic growth nexus in Nigeria // International Journal of Academic Research in Business and Social Sciences. 2015. Vol. 5, No. 1. Pp. 376–382. https://doi.org/10.6007/IJARBSS/v5-i1/1439

21. *Van V. B., Sudhipongpracha T.* Exploring Government Budget Deficit and Economic Growth: Evidence from Vietnam's Economic Miracle // Asian Affairs: An American Review. 2015. Vol. 42, Issue 3. Pp. 127–148. https://doi.org/10.1080/00927678.2015.1048629

22. *Gold K. L., Adetunji K. O., Yusuf H. A., Sulaiman S.* Electricity Production, Consumption, and Manufacturing Sector Performance in Nigeria: A Multi-Decade Analysis // Journal of Applied Economic Research. 2024. Vol. 23, No. 4. Pp. 1077–1098. https://doi.org/10.15826/vestnik.2024.23.4.042

23. *Nath H. K., Liu L.* Information and communications technology (ICT) and services trade // Information Economics and Policy. 2017. Vol. 41. Pp. 81–87. https://doi.org/10.1016/j.infoecopol.2017.06.003

24. *Khusaini K., Ramdani H. C., Syamiya E. N., Aisyah I.* Does the government expenditure on education and family income boost educational expansion?: Lesson from panel FMOLS // Review of Applied Socio-Economic Research. 2022. Vol. 24, Issue 2. Pp. 89–105. https://doi.org/10.54609/reaser.v24i2.140

25. *Qehaja S. S., Qehaja D., Arber H., Marovci E.* The relationship between government health expenditure and economic growth: Evidence from western Balkan countries // International Journal of Applied Economics, Finance and Accounting. 2023. Vol. 15, No. 1. Pp. 10–20. https://doi.org/10.33094/ijaefa.v15i1.724

26. *Solow R. M.* A contribution to the theory of economic growth // The Quarterly Journal of Economics. 1956. Vol. 70, Issue 1. Pp. 65–94. https://doi.org/10.2307/1884513

27. *Anderu K. S., Omotayo E. O.* Agricultural output and government expenditure in Nigeria // Jurnal Perspektif Pembiayaan dan Pembangunan Daerah. 2020. Vol. 8, No. 2. Pp. 101–110. https://doi.org/10.22437/ppd.v8i2.9106

28. *Tanzi V., Zee H.* Fiscal Policy and Long-Run Growth // IMF Staff Papers. 1997. Vol. 44, No. 2. Pp. 179–209. https://doi.org/10.5089/9781451947243.024

29. *Shrestha M. B., Bhatta G. R.* Selecting appropriate methodological framework for time series data analysis // The Journal of Finance and Data Science. 2018. Vol. 4, Issue 2. Pp. 71–89. https://doi.org/10.1016/j.jfds.2017.11.001

30. *Gujarati D. N., Porter D.* Basic Econometrics. 5th Edition. New York: McGraw Hill Inc., 2009. 922 p. URL: https://ucanapplym.s3.ap-south-1.amazonaws.com/RGU/notifications/E_learning/0nline_study/Basic-Econometrics-5th-Ed-Gujarati-and-P.pdf

31. *Johansen S., Juselius K.* Maximum likelihood estimation and inference on cointegration — with applications to the demand for money // Oxford Bulletin of Economics and Statistics. 1990. Vol. 52, Issue 2. Pp. 169–210. https://doi.org/10.1111/j.1468-0084.1990.mp52002003.x

32. *Olawale A. M., Kehinde J. E., Gold K. L., Agboola Y. H., Adebayo O. M., Modupe O.* The nexus between economic growth, institutional quality, and poverty in Nigeria // Journal of Emerging Economies & Islamic Research. 2023. Vol. 11, No. 3. Pp. 94–108. https://doi.org/10.24191/jeeir.v11i3.22417

33. *Engle R. F., Granger C. W.* Co-integration and error correction: representation, estimation, and testing // Econometrica. 1987. Vol. 55, No. 2. Pp. 251–276. https://doi.org/10.2307/1913236

34. *Pesaran M. H., Shin Y., Smith R. J.* Bounds testing approaches to the analysis of level relationships // Journal of Applied Econometrics. 2001. Vol. 16, Issue 3. Pp. 289–326. https://doi.org/10.1002/jae.616

35. *Tilahun Mengistu S.* Does fiscal policy stimulate economic growth in Ethiopia? ARDL approach // Cogent Economics & Finance. 2022. Vol. 10, Issue 1. 2104779. https://doi.org/10.1080/23322039.2022.2104779

36. *Adenomon M. O., Ojo R. O.* Autoregressive distributed lag modelling of the effects of some macroeconomic variables on economic growth in Nigeria // Folia Oeconomica Stetinensia. 2020. Vol. 20, Issue 2. Pp. 1–19. https://doi.org/10.2478/foli-2020-0032

37. *Owusu-Manu D.-G., Jehuri A. B., Edwards D. J., Boateng F., Asumadu G.* The impact of infrastructure development on economic growth in sub-Saharan Africa with special focus on Ghana // Journal of Financial Management of Property and Construction. 2019. Vol. 24, No. 3. Pp. 253–273. https://doi.org/10.1108/JFMPC-09-2018-0050

38. *Ogunlana F. O., Omolara Y. J., Taiwo A. B.* Infrastructure finance and development in Nigeria // Nigerian Chapter of Arabian Journal of Business and Management Review. 2016. Vol. 3, No. 12. Pp. 1–11. http://dx.doi.org/10.12816/0027217

39. *Obinabo C. R., Agu B. O.* Effect of fiscal deficit on selected macroeconomic variables in Nigeria: A time series analysis, 1986–2018 // International Journal of Academic Research in Economics and Management Sciences. 2019. Vol. 8, Issue 2. Pp. 68–80. https://doi.org/10.6007/IJAREMS/v8-i2/6276

40. *Sanya O., Abiola L. N.* Fiscal deficit and economic growth, Nigeria experience // International Journal for Innovation Education and Research. 2015. Vol. 3, No. 11. Pp. 6–15. http://dx.doi.org/10.31686/ijier.vol3.iss11.459

41. *Kim N.* A Jarque-Bera type test for multivariate normality based on second-power skewness and kurtosis // Communications for Statistical Applications and Methods. 2021. Vol. 28, No. 5. Pp. 463–475. https://doi.org/10.29220/csam.2021.28.5.463

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