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Public Revenue-Expenditure Nexus: A Test of Fiscal Synchronization Hypothesis in Nigeria

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Abstract

Fiscal synchronization hypothesis which argues a bi-directional causality between public revenue and expenditure, is one of the four basic schools of thought on the nexus between public revenue and expenditure. The hypothesis is one of the mostly advocated and recommended for adoption for most countries most especially, developing economies. Hence, the thrust of this study was to test within the Granger causality framework, the validity of the fiscal synchronization hypothesis in Nigeria's states and Federal Capital Territory (FCT) for the period 1981 to 2020. Hence, study aims to determine if there is a long-run relationship between public revenue and expenditure and to also evaluate the applicability of fiscal synchronization hypothesis in Nigeria. Empirical findings of this study suggest the existence of a long-run relationship between government revenue and there was a two-way causal relationship between revenue and expenditure of the states and FCT in Nigeria in the period of study. Therefore, this study confirms the validity of fiscal synchronization hypothesis in Nigeria's states and federal capital territory. It therefore recommended that the state government and the FCT to always make their revenue and expenditure decisions simultaneously in order to contract the fiscal deficit gap in the country.

Keywords: Public Expenditure; Public Revenue; Government Expenditure; Government Revenue; Fiscal Synchronization Hypothesis; State Government.

1. Introduction

The aim of any government is to utilize the available scarce resources to ensure the growth and development of the country. Various policy initiatives have been crafted out by successive governments geared towards achieving this generic aim of governance. One of these policies is the fiscal policy- the use of public revenue (taxation), expenditure and debt in controlling/regulating the economy in order to attain certain economic ends such as price stability, even distribution of income, poverty reduction, economic growth, among others. Revenue and expenditure and the nexus between the two are key policy issues in public finance and fiscal policy specifically. Thus, key to facilitating the achievement of the fiscal objectives is understanding the nexus between public revenue and expenditure. Irandoust (2018) reiterates that understanding the revenue-expenditure nexus is important in order to determine the appropriate strategy for fiscal discipline and fiscal policy. Sound fiscal policy is important to promote internal balance such as price stability and sustainable growth in output and employment and thus understanding the relationship between government revenue and expenditure is important to evaluate how to address fiscal imbalances (Karim et al., 2006). The relationship between revenue and government expenditure is an important subject in public finance especially for Nigeria, which is suffering from persistent budget deficits.

Although, there have been several studies on the nexus between public revenue and expenditure; the various findings therefrom have been classified into four schools, namely, the earn-and-spend, the spend-and-earn, the fiscal synchronization and fiscal neutrality schools of thought. Firstly, the earn-and-spend hypothesis (or tax-spend, or revenue dominance hypothesis) proposed by Buchanan and Wagner (1977) and Friedman (1978) argue the existence of a unidirectional causality flow from government revenue to government expenditure. Similar studies have also confirmed this hypothesis (Yinusa et al (2017), Yinusa and Adedokun (2017) in Nigeria; Rezaei (2015) in Iran; Sahed et al. (2020) in Algeria). Secondly, the spend-and-earn hypothesis (or spend-tax or expenditure dominance hypothesis) led by Peacock and Wiseman (1961, 1979) states that there is a unidirectional causality from government expenditures to revenue. This finding has also been supported by studies such as Uche and Ogbonna (2018), Abdulrasheed (2017) in Nigeria; Jalil and Harun (2012) in Malaysia. Thirdly, the fiscal neutrality hypothesis (also called institutional separation or fiscal independence hypothesis) led by Wildavsky (1988) and Baghestani and McNown (1994) asserts non-causality between government expenditure and revenue. According to the hypothesis, neither of government revenues and expenditures are related with the budget expansion. Other studies in support of the fiscal neutrality hypothesis are Dada (2013), Ibrahim (2020), in Nigeria.

This notwithstanding, empirically, most of the past studies that had tested the fiscal synchronization hypothesis have focused on the central/federal government. Although, some studies have provided evidence in support of the fiscal synchronization hypothesis (Irandoust (2018) in Swedish economy; Marimuthu et al. (2021) in ASEAN region; Mehrara et al. (2011) in Asian countries; Kaya and Arslan (2020) in Turkey; Al-Zeaud (2015) in Jordan; Jiranyakul (2017) in Thailand; Hye and Jalil (2010) in Romania; Soomro (2020) in Pakistan; Phiri (2016); Takumah (2014) in Ghana; Saka et al. (2015) and, Aminu and Raifu (2018), Ibrahim (2018), Eniekezimene, et al (2019) and Aladejare and Ani (2012) all in Nigeria). Most of these past research works mostly focused squarely on the central/federal government with little or no concern about how the state/local government behavior in terms of the connection between their revenue and expenditure most especially in developing countries such as Nigeria which is found in a situation of wide fiscal deficit net. Hence, this current study is handy by investigating the causality between States' and FCT revenue and expenditure in Nigeria with a particular emphasis of testing the validity of the fiscal synchronization hypothesis at the state level in Nigeria.

The main aim of this study was to test the validity of the fiscal synchronization hypothesis at the state level in Nigeria by investigating the causality between States and Federal Capital Territory revenue and expenditure in Nigeria. This research is expected to provide empirically-based answers to these research questions: Is the fiscal synchronization hypothesis in Nigeria's States and Federal Capital Territory? Is there any cointegration between the revenue and expenditure of the States and Federal Capital Territory of Nigeria?

This other part of paper is structured thus. Contained in section two is the literature review on government revenue and expenditure with emphasis on the fiscal synchronization. The data and methodology of the study is the subject matter of section three while section four contains the results and discussion of findings. Finally, conclusion and recommendations are provided in section five.

2. Literature Review

Theoretically, there are four views on the nexus between public revenue and public expenditure. The Peacock and Wiseman (1961, 1979)'s spend-tax hypothesis proposes that government expenditure as causal factor for government revenue with a unidirectional causality flow from the former to the latter. Conversely, the existence of a unidirectional causality from government revenue to government expenditure is the thesis of the earn-spend hypothesis of Buchanan and Wagner (1977) and Friedman (1978). The fiscal neutrality hypothesis led by Beghestan and McNown (1994) and Wildavsky (1988) considers neither government revenue nor government expenditure as determinant of budget expansion/contraction such no causal relationship exists between government revenue and expenditure. The fourth view, which is the focus of this study is the fiscal synchronization hypothesis, led Musgrave (1966) and Meltzer and Richard (1981), asserts that public revenue and public expenditure are jointly determined by the fiscal authorities such that there is a bidirectional causality between government revenue and government expenditure. Therefore, in determining the appropriate levels of government expenditure and government revenue, voters carry out a cost-benefit analysis of the marginal costs and marginal benefits of government services. Furthermore, Irandoust (2018) explains that based on the hypothesis, government's decision on the optimal levels of expenditure and taxation is determined concurrently and depends on the voters' welfare maximizing demand for public services and on voters' attitude towards the redistribution function of the government, based on the comparison of their marginal benefits and cost of public services.

Therefore, this study is anchored on the fiscal synchronization hypothesis because it constitutes the main thrust of this study. The hypothesis is single-handedly examined due to its popular advocacy and recommendation by various policies makers and researchers. According to Musgrave (1966) and Meltzer and Richard (1981), voters compare the marginal benefits and costs of government programs when they decide on the level of public expenditure and revenue. According to the authors, government may change spending and revenues simultaneously and thus adhere to the tax-and-spend and spend-and-tax fiscal situations simultaneously.

Empirically, some studies have examined the nexus between public revenue and expenditure with particular emphasis on the fiscal synchronization hypothesis in the focus or findings. For instance, Irandoust (2018) examines the long-run causal relationship between government revenues and spending of the Swedish economy. The result of the study is a bi-directional causality between revenues and expenditures which lends credence to the validity of the fiscal synchronization hypothesis in the country. In another, Marimuthu et al. (2021) establish a bidirectional causality exists between government expenditures and government revenues in Southeast Asian Nations (ASEAN) region. Likewise, Mehrara et al. (2011) confirm a bidirectional causal relationship between government expenditure and revenues in 40 Asian countries. Kaya

and Arslan (2020)'s study suggests the existence of a symmetric bidirectional causality between total revenues and government expenditures in Turkey. Al-Zeaud (2015) also shows that two-way causality exists between revenues and expenditure in Jordan. Furthermore, Omoshoro-Jones (2020) examines government revenue–expenditure nexus for the Free State Province and the study found a bidirectional causality subsists between government revenues and expenditures in the Province. Moreover, Jiranyakul (2017) confirms a bidirectional causality between government revenue and expenditure in Thailand. Similarly, Hye and Jalil (2010)'study indicates a bidirectional causality between Romanian government expenditure and revenue. Soomro (2020) also reiterates that Pakistan government also follows budget synchronization. In another study, Phiri (2016) examines asymmetric equilibrium effects in the South African fiscal budget and confirms a bi-directional causality between revenues and expenditures in the country. Moreover, Takumah (2014) argues that there is a bidirectional causality between government expenditure and revenues thus confirming the fiscal synchronization hypothesis in Ghana.

In the Nigerian context, few studies tend towards providing support for fiscal synchronization hypothesis in the country. Among these studies is Saka et al. (2015) examine the validity of fiscal synchronization hypothesis in Nigeria. The study found evidence of bi-directional causalities between recurrent expenditure and oil revenue, and between non-oil revenue and recurrent expenditure. Likewise, Aminu and Raifu (2018) examine the asymmetric causality between revenues and expenditures in Nigeria. The study reveals that government revenue and expenditure influences each other simultaneously in the country. Ibrahim (2018) re-examines the government expenditure-revenue nexus in Nigeria and the causality test without break suggests the existence of a bi-directional causality between government expenditure and revenue in Nigeria. Furthermore, Eniekezimene et al (2019) evaluate the influences of various tax revenues and duty elements on public expenditure in Nigeria. The study discovered among others, a bidirectional causal relationship between personal income tax and government expenditure and valued added tax and government expenditure. In another empiric, Aladejare and Ani (2012) confirm an evidence of a bi-directional causality between government revenue and government expenditure in Nigeria.

In summary, most international and domestic evidence providing support for validity of the fiscal synchronization hypothesis was established via Granger causality technique and most of these studies focused on the central/federal government without considering the spend-earn behavior of the state governments.

3. Methodology

The study is based on ex-post facto research whereby past (historical) time series data were employed in the analysis of public revenue and expenditure in Nigeria with a particular emphasis on the States government and Federal Capital Territory of Nigeria. The secondary data were extracted from the Central Bank of Nigeria (2020)'s statistical bulletin on total state government and FCT revenue and expenditure. The pairwise Granger-causality test was applied in the establishment of causal relationship between government expenditure and revenue for the period 1981-2020. Preliminary tests conducted are the descriptive statistical, unit root and cointegration tests. The descriptive statistical test is in the form of summary statistics. The Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) unit root tests were employed to determine the stationarity or otherwise of the two variables of study. Thereafter, the Johansen cointegration test was applied to the I(1) series.

The Granger causality equations of the nexus between public revenue and expenditure are specified in equations (1) and (2).

$$\text{Log}(\text{SGREV})_t = \sum_{i=1}^n \beta_i \text{Log}(\text{SGEXP})_{t-1} + \varepsilon_{t1} \dots \dots \dots (1)$$

$$\text{Log}(\text{SGEXP})_t = \sum_{i=j}^n \beta_j \text{Log}(\text{SGREV})_{t-1} + \varepsilon_{t2} \dots \dots \dots (2)$$

Where:

SGREV corresponds total State governments' and Federal Capital Territory revenue in Nigeria;

SGEXP refers to total State governments' and Federal Capital Territory expenditure in Nigeria;

Log denotes natural logarithm of the variables.

4. Results and Discussion

4.1 Descriptive Statistics

The summary statistics of the variables of study as presented in Table 1 shows that the average expenditure for the states government and FCT in the study period (1981-2020) exceeds their revenue, which tends to suggest an apparent situation of budget deficit. Both the minimum (5.7700) and maximum (4763.08) expenditure exceeds both the minimum (4.3300) and maximum (3905.38) revenue for the states government and FCT in Nigeria. Considered the fact that the standard deviation of both revenue (1488.108) and expenditure (1704.472) exceed their respective mean values (1300.118 and 1458.277), it can be inferred therefrom that the two variables exhibit relatively wide dispersion from their mean values. Both variables (SGREV and SGEXP) have their skewness close to zero. The Jarque-Bera test of normality indicates that both SGREV and SGEXP attain normality at 5%.

Table 1: Summary Statistics

	N	Mean	Max.	Min.	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
SGREV	40	1300.118	3905.380	4.3300	1488.108	0.6054	1.6552	5.4573*
SGEXP	40	1458.277	4763.080	5.7700	1704.472	0.6716	1.7858	5.4639*

Source: Authors' computation using Eviews 10 (2021).

Note: * denotes significant at 10% since the p-value is less than 0.10

4.2 Unit Root Tests

Two different unit root tests (Augmented Dickey-Fuller (ADF) and Phillips-Perron(PP) test) were conducted on the log-transformed time series data on government revenue and expenditure and the results of the two tests are presented in Tables 2. Both ADF and PP test unanimously confirms the non-stationary of both variables (government revenue and expenditure) at level. However, both variables attain stationarity after first differencing. Thus, the two variables could be said to be I(1) series.

Table 2: Phillips-Perron (PP) and Augmented Dickey-Fuller (ADF) Unit Root Tests

Variables	PP test statistics at level			PP test statistics at first difference			I(d)
SGEXP	-0.5732	0.8650	Not Stationary	-3.6652	0.0088*	Stationary	I(1)
SGREV	-1.1506	0.6857	Not Stationary	-4.5392	0.0008*	Stationary	I(1)
Variables	ADF test statistics at level			ADF test statistics at first Difference			I(d)
SGEXP	-0.5211	0.8762	Not Stationary	-3.7282	0.0075*	Stationary	I(1)
SGREV	-1.3532	0.5949	Not Stationary	-4.4981	0.0009*	Stationary	I(1)

Source: Authors' computation using Eviews 10 (2021).

Note: * stationary at 1% since the *p*-value is less than 0.01 hence the rejection of the null hypothesis of presence of unit root in the variables.

4.3 Cointegration Tests

Johansen unrestricted cointegration test was conducted on the variables which are integrated of order one. The results of both the Trace and Max-eigenvalue tests in Table 3 indicate two cointegrating equations at the 0.05 level. This suggests that the two variables of study are cointegrated which implies that there is a long-run relationship between government revenue and expenditure of the States government and Federal Capital Territory of Nigeria.

Table 3: Johansen Cointegration Rank Test

A. Unrestricted Cointegration Rank Test (Trace)					
Hypothesized CE(s)	No. of	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *		0.4045	27.4441	15.4947	0.0005
At most 1 *		0.1842	7.7404	3.8414	0.0054
B. Unrestricted Cointegration Rank Test (Maximum Eigenvalue)					
Hypothesized CE(s)	No. of	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *		0.4045	19.7037	14.2646	0.0063
At most 1 *		0.1842	7.7404	3.8414	0.0054

Source: Authors' computation using Eviews 10 (2021).

Note: * denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) *p*-values

4.4 Pairwise Granger Causality

Granger causality technique was applied to test the validity of fiscal synchronization hypothesis using the data of state governments and FCT of Nigeria. The results of the Granger causality as presented in Table 4 indicate that both government revenue and expenditure Granger-causes each other with a complete feedback effect. This means that there is a bidirectional causality government revenue and expenditure of State government and FCT of Nigeria. By this result, this study therefore confirms the validity of the Musgrave (1966) and Meltzer and Richard (1981)'s fiscal synchronization hypothesis (or budget synchronization hypothesis) in the Nigeria's States and FCT. This finding of this study is similar to the confirmation of the fiscal

synchronization hypothesis various past studies such as Irandoust (2018) in Swedish economy; Marimuthu et al. (2021) in ASEAN region; Mehrara et al. (2011) in Asian countries; Kaya and Arslan (2020) in Turkey; Al-Zeaud (2015) in Jordan; Jiranyakul (2017) in Thailand; Hye and Jalil (2010) in Romania; Soomro (2020) in Pakistan; Phiri (2016); Takumah (2014) in Ghana. In the Nigerian context, some studies have also confirmed the validity of the fiscal synchronization hypothesis at the federal government level (Saka et al. (2015), Aminu and Raifu (2018), Ibrahim (2018), Eniekezimene, et al (2019), Aladejare and Ani (2012)).

The implication of the fiscal synchronization is that the Nigeria's state government and FCT seems to make their revenue and expenditure decisions concurrently. Hence, the optimum revenue-expenditure decision is made in line with the cost-benefit analysis of the marginal cost and marginal benefits of the taxation as carried by the tax payers(citizens/voters) at the state and FCT level in Nigeria.

Table 4: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.	Decision
SGREV does not Granger Cause SGEXP	38	8.26300	0.0012*	Reject
SGEXP does not Granger Cause SGREV		3.96530	0.0286**	Reject

Source: Authors' computation using Eviews 10 (2021).

Note: Rejection of the null hypothesis at 5% and 1% respectively.

5. Conclusion and Recommendations

This study tested the validity of the fiscal synchronization hypothesis in Nigeria's states and Federal Capital Territory (FCT) for the period 1981 to 2020 pairwise Granger causality technique. Empirical findings of this study suggest the existence of a long-run relationship between government revenue and there was a two-way causal relationship between revenue and expenditure of the states and FCT in Nigeria. Therefore, this study confirms the validity of Musgrave (1966) and Meltzer and Richard (1981)'s fiscal synchronization hypothesis in Nigeria's states and federal capital territory. The implication of the fiscal synchronization is that the Nigeria's state government and FCT seems to make their revenue and expenditure decisions concurrently. Hence, the optimum revenue-expenditure decision is made in line with the cost-benefit analysis of the marginal cost and marginal benefits of the taxation as carried by the tax payers(citizens/voters) at the state and FCT level in Nigeria.

It therefore recommended that the state government and the FCT to always make their revenue and expenditure decisions simultaneously in order to contract the fiscal deficit gap in the country. Thus, a planned expenditure expansion should be concurrently followed by the planned expansion and diversification of the revenue base of the country and vice versa, a cut in public revenue (tax) should be accompanied by a reduction in public spending.

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