Budget transparency and internal revenue mobilisation at sub-national government level: evidence from Nigeria

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Abstract

Internal revenue mobilisation by governments at the sub-national level has been low in Nigeria. In view of the rise in the level of budget transparency at the sub-national level in recent times, this study examines the hypothesis that improved budget transparency leads to greater revenue mobilisation. The study adopts both cross-sectional and panel regression analyses based on data for 2015, 2018 and 2020. The findings suggest that the hypothesis that improved budget transparency improves revenue mobilisation cannot be rejected, but population density (urbanisation), poverty and unemployment are the dominant factors that explain revenue mobilisation by the state governments in Nigeria. The study also reiterates the need to control corruption in order to make sustainable progress in revenue mobilisation at sub-national level.

Keywords: tax, revenue, budget transparency, sub-national government, Nigeria

1 INTRODUCTION

Nigeria is a fiscal federal state comprising three levels of government – the federal government at the national level, and the 36 states and the Federal Capital Territory (FCT), as well as 774 local governments at the sub-national level. The Constitution of the Federal Republic of Nigeria has empowered the sub-national governments to mobilise independent revenue in their respective jurisdictions, often referred to as internally generated revenue (IGR). This comprises tax and non-tax revenues. The sub-national governments also receive statutory transfers monthly from the revenue collected centrally by the federal government and kept in the federation account. Over time, the heavy reliance of sub-national governments on statutory transfers from the federation account has continued to be an issue of mounting concern in Nigeria's fiscal federalism, despite several efforts to improve IGRs (Iniodu, 1999). With the exception of a few states such as Lagos, Ogun, Rivers and Kaduna, where IGR accounts for a substantial share of total revenue, the majority of the states heavily depend on statutory federal transfers for fiscal buffers. For instance, according to the fiscal sustainability index report of 2019, only 3 out of the 36 states could comfortably meet their primary expenditures with their IGRs only, without having to rely on federal transfers/statutory allocation (Adegboyega, 2019). The flow of federal transfers is determined by crude oil prices and the volume of crude sold in the international oil market. Intermittent shocks in the oil market have had adverse effects on the flow of federal transfers, resulting in fiscal crises in the majority of the states.

Several factors have been established in the literature that could be responsible for poor revenue mobilisation by a government. These include low tax compliance and morale of citizens owing to a lack of trust in the government, as well as corruption in the system (Ghura, 1998; Ajaz and Ahmad, 2010; Jahnke and Weisser, 2019; Abdu, Jibril and Muhammad, 2020; Abebe and Fikre, 2020; Zvereva et al., 2021; Yaru and Raji, 2022). Corruption directly affects revenue mobilisation negatively by encouraging tax evasion and revenue theft by public officials, and

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indirectly by lowering taxpayers' morale (Ghura, 1998; Ajaz and Ahmad, 2010; Jahnke and Weisser, 2019; Abebe and Fikre, 2020; Yaru, 2022). However, an increase in the level of budget/fiscal transparency reduces corruption and improves citizens' satisfaction with and trust in the government and tax morality (Bastida and Benito, 2007; Zhang, 2017; Hu et al., 2020; Zvereva et al., 2021). Budget transparency, which implies full disclosure of budget information, reduces the principal-agency problem arising from the information advantage of public officials as agents over the citizens.

Also, budget transparency, which entails public participation in the budget process, provides an avenue through which citizens are able to understand government proposals, participate in choices of public projects and supervise government activities, thereby reducing the perceived level of corruption in the government (Zhang, 2017; Estrada and Bastida, 2020) and boosting citizens' tax morale. The quality of governance also increases with budget transparency (Bisogno and Cuadrado-Ballesteros, 2021). These arguments have propelled the upsurge in budget transparency and accountability initiatives by civil society organisations (CSOs), international development partners and financial institutions, including the World Bank and the International Monetary Fund (IMF) as a way of controlling corruption in governance, particularly in countries like Nigeria where corruption has been endemic (Carlitz, 2013). Nigeria's corruption perception index (CPI) score was 24 out of 100 in 2021, which placed it in the 146th position out of 183 countries (Transparency International, 2022). Similarly, the Open Budget Index (OBI), a measure of budget transparency published by the International Budget Partnership (IBP), shows that Nigeria scored 21 out of 100 in 2019 (IBP, 2019). This suggests that the country is not doing well with respect to either budget transparency or control of corruption at the national level. Though improving over time and relatively better than the national government, the average performance of state governments in overall budget transparency is also low, according to data published by the Civil Resources Development and Documentation Centre (CIRDDOC) in 2015, 2018 and 2020.

Both the government and CSOs in Nigeria have taken measures to promote budget transparency. The Federal Government of Nigeria, through the National Assembly, has enacted a slew of legislation, including the Fiscal Responsibility Act, 2007, Public Procurement Act, 2007 and Freedom of Information Act to provide a legal and institutional framework to promote transparency in the conduct of fiscal governance at the federal level. Most state governments have domesticated these laws and also subscribed to the Open Government Partnership (OGP). Other measures taken to promote fiscal transparency at the sub-national level in Nigeria include the State Fiscal Transparency, Accountability and Sustainability Program-for-Result (SFTAS), which is a conditional grant programme introduced by the World Bank and tied to state-level fiscal transparency. Also, a Nigeria-based civil society organisation, the Civil Resources Development and Documentation Centre (CIRDDOC), with support from the Department of Finance for International Development (DFID)

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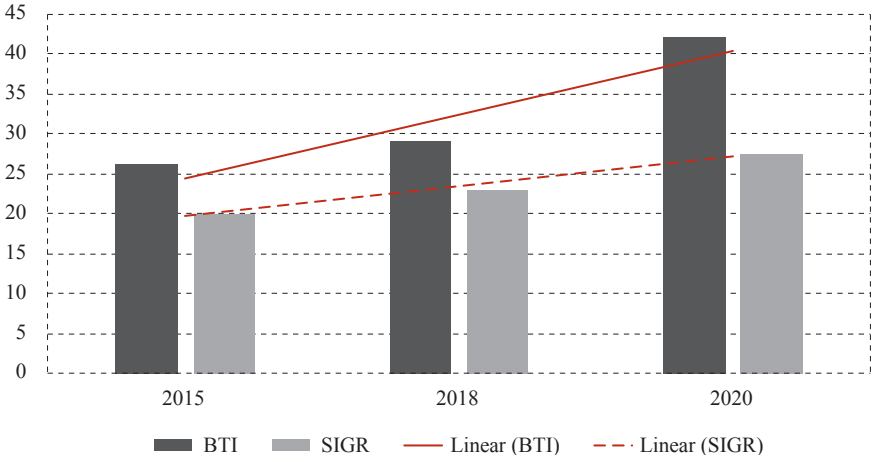
and the International Budget Partnership has since 2012 been conducting a periodic sub-national Budget Transparency Survey (SNBTS) in Nigeria using a network of budget advocacy partners, mainly CSOs and budget experts drawn from tertiary institutions across the 36 states. One major goal of the survey is to gauge the level of transparency in the budget processes, encourage research and instil the culture of transparency among the states. The surveys have resulted in the production of indices of state-level budget transparency for 2015, 2018 and 2020.

Figure 1 shows the average trend of the Budget Transparency Index (BTI) juxtaposed with IGR performance of state governments measured as average percentage share of IGR in aggregate revenue. On average, the state-level budget transparency as reported in figure 1 has been on a steady rise, likewise the share of IGR in the total revenue of state governments (see figure 1). Thus, given the observed pattern, can the modest rise in IGR performance of state governments be linked to the improvement in the level of budget transparency? Unfortunately, no study has examined the impact of budget transparency on revenue performance of the state governments in Nigeria, and studies on other countries do not abound. Available empirical studies on Nigeria delve into the impact of economic factors on government revenue, at both national and sub-national levels (Eiya and America, 2018; Ohiokha and Ohiokha, 2018; Yaru, 2020). Studies on other countries largely examine the economic and political determinants of budget transparency (Caamaño-Alegre et al., 2013; Sun and Andrews, 2020), while some look at its relationship with corruption and quality of governance (e.g., Bisogno and Cuadrado-Ballesteros, 2021) rather than its impact on revenue mobilisation. Zvereva et al. (2021), which is most closely relevant to the current study, examines the impact of budget transparency on tax compliance.

Figure 1

Trends of average Budget Transparency Index and percentage share of IGR in Aggregate Revenue of State Governments (SIGR), 2015-2020



Source: Compiled from CIRDDOC, 2015, 2018 and 2020, and BudgIT database for various years.

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In an attempt to cover the above gap, this study examines the hypothesis that improved budget transparency leads to greater revenue performance, using both cross-sectional and panel data sets of the state governments in Nigeria. The finding of this study will indicate whether or not the argument that budget transparency enhances domestic revenue mobilisation has empirical support in Nigeria. The remaining parts of this paper are divided into five sections as follows: section 2 provides a review of the literature, section 3 discusses the empirical analysis, section 4 presents the descriptive statistics and correlation analysis, section 5 contains the results and discussion of findings, while section 6 draws the conclusion.

2 REVIEW OF LITERATURE

Both the theoretical literature and the empirical literature have identified the basic factors influencing tax revenue performance by the government. These factors could be grouped into economic, demographic, political and institutional factors (Ajaz and Ahmad, 2010). Of these factors, economic and demographic factors, which include the tax/revenue base of the government (usually measured by the nature and volume of economic activities such as private investment and size of per capita income) and population density/urbanisation, have direct and positive impacts on tax revenue (Karran, 1985; Ade, Rossouw and Gwatidzo, 2018; Andrejovskà and Pulikovà, 2018; Yaru, 2020). However, political and fiscal institutional factors, which include governance, influence tax revenue indirectly through the economic variables, particularly the tax base (Karran, 1985) and efficiency in tax collection (Coulibaly and Gandhi, 2018). For instance, in practice, potential and actual revenue bases, tax efforts, compliance and revenue administration in a fiscal federal setup like Nigeria are determined by political and fiscal institutions, which include the tax laws, intergovernmental fiscal relations and assignment of fiscal responsibilities as defined in the Constitution. Similarly, governance is also an important factor for voluntary tax compliance and tax revenue performance (Ajaz and Ahmad, 2010). The citizens gauge good governance by the degree to which a government is able to provide basic social amenities (Ortega, Ronconi and Sanguinet, 2016) and conducts its business in a transparent manner. Taxpayers' willingness to pay taxes improves when the government is transparent and able to provide basic social amenities (Ortega, Ronconi and Sanguinet, 2016; Zvereva et al., 2021). This argument is corroborated by Yaru and Awodun (2019), a study based on the experience of Internal Revenue Service field staff at the sub-national level, which shows that taxpayers will not be willing to pay taxes if the government fails to provide social amenities, or when there is no trust in government.

Corruption is another major institutional variable that has been found to be detrimental to tax revenue performance (Ajaz and Ahmad, 2010; Eiya and America, 2018; Yaru and Raji, 2022). The ratio of tax revenue to GDP appears to be relatively low in countries with high levels of corruption (Ghura, 1998). Corruption leads to revenue leakages and dampens taxpayers' tax morale (Ajaz and Ahmad, 2010; Jahnke and Weisser, 2019). All of these negatively affect governemnt revenue. The empirical literature on Nigeria corroborates the argument that **c**orruption has a

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negative and significant impact on national tax revenue performance (Eiya and America, 2018). Population density, a measure of economic base and revenue efforts, however has a positive impact on the revenue performance of local governments in Nigeria (Yaru, 2020). The impact of grants on tax revenue is found to be negative in the short run but positive in the long run, while loans have a positive impact in the short run and a negative impact in the long run (Amusa, Monkam and Veigi, 2020). In contrast, the effect of population growth (another measure of growth of tax base) on national tax revenue is found to be statistically insignificant (Ohiokha and Ohiokha, 2018). This finding contradicts the theory. This might be due to the incidence of poverty, unemployment and the non-inclusive economic growth experienced in the country (Yaru et al., 2018).

So far, the review provides a general insight into how some economic and demographic variables influence tax revenue performance, but not much could be discerned about the effect of fiscal institutions, particularly budget transparency, on domestic revenue mobilisation by state governments in Nigeria. This study intends to fill this gap by examining the impact of budget transparency on the internal revenue performance of state governments in Nigeria.

3 EMPIRICAL ANALYSIS

The study uses both simple descriptive statistical and econometric analyses to achieve its objective. Table 1 presents the details of all the variables in the models, their measurements and sources of data. The descriptive analysis involves the summary statistics, which include the mean, range and standard deviation of both the dependent and independent variables for the 36 states presented in table 2. Similar statistics for the 17 states in the south and 19 northern states are provided in tables A1 and A2 in appendix. In addition, the linear relationships between the variables are examined using pairwise correlation analysis. Table 3 provides the results.

The econometric analysis involves the estimation of cross-sectional and panel data regression models specified in equations 1 and 2 respectively. The models examine the impacts of economic factors/revenue base proxied by population density (PDS), socio-economic factors proxied by poverty (POV) and unemployment rates (UR), political factors (POF) proxied by length of years the state governor spends in office (YEARS), dummy variables for term in office (TERM) and political party affinity with the ruling party in the centre (PAC), and measures of budget transparency (BT) on the internal revenue performance of state governments (SIGR) in Nigeria.

$$SIGR_i = \beta_1 + \beta_2 PDS_i + \beta_3 POV_i + \beta_4 UR_i + \beta_5 POF_i + \beta_6 BT_i + \varepsilon_i \quad (1)$$

$$SIGR_{it} = \beta_{1i} + \beta_2 PDS_{it} + \beta_3 POV_{it} + \beta_4 UR_{it} + \beta_5 POF_{it} + \beta_6 BT_{it} + \beta_7 COR_{it} + \beta_8 BT \times COR_{it} + \varepsilon_{it} \quad (2)$$

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Where:
$SIGR_{it}$ = State IGR proxied by State's IGR share in total revenue,
PDS_{it} = Economic factor/revenue base measured by population density in the state,
POV_{it} = Measure of poverty (Poverty headcount ratio),
UR_{it} = Unemployment rate,
POF_{it} = Measures of Political Factors,
BT_{it} = Measures of Budget Transparency,
COR_{it} = Control of Corruption,
ε_i and ε_{it} = Error Terms,
β_j = Coefficients, j = 1, 2,…8 and i = 1, 2, 3…, 36, t = 1, 2, 3.

A-priori, the impacts of the socio-economic variables (population density/urbanisation, poverty and unemployment) on revenue are direct and unambiguous. For instance, the measure of the revenue base in the model, which is population density/urbanisation, is expected to have a positive impact on state revenue performance, while poverty and unemployment are expected to have negative effects on revenue. Increase in level of poverty or unemployment would reduce the taxable population/tax base, and consequently, potential tax revenue. Political and fiscal variables may not necessarily have definite a-priori expectations. For instance, it is expected that states with governors that belong to the ruling party at the federal level may enjoy some fiscal privileges and capital projects from the federal government, which might reduce their independent revenue efforts. Thus, it is assumed that political party affinity with the centre may impact negatively on independent revenue efforts of states and domestic revenue mobilisation. It is also expected that state governors who are serving their first terms in office may not want to indulge in aggressive tax reforms that will make them unpopular among the electors and jeopardise their re-election prospect. Aggressive tax and other revenue reforms are mostly implemented by governors in their second term in office. Thus, term in office should impact positively on revenue mobilisation, likewise length of years spent by the governor in office.

Aggregate budget transparency and its various components are however expected to have positive influences on revenue performance through citizens' voluntary tax compliance. The argument put forth here is that increase in fiscal transparency will improve citizens' trust in the government, which will in turn improve voluntary tax compliance and revenue performance (Zvereva et al., 2021; Yaru, 2022). Budget transparency is also expected to improve citizens' participation in governance, promote good governance and reduce corruption in revenue administration (Bastida and Benito, 2007). All of these should result in improved revenue mobilisation.

Table 1

Variables, measurement and data sources

Variables	Measurement	Impact on IGR (a-priori expectation)	Sources
Internally Generated Revenue (IGR)	Share of IGR in total Revenue (SIGR)		Publications of NBS (Annual Abstract of Statistics) and BudgIT publications for various years
Economic Factors	Population Density (Number of People per Square Km) (PDS)	Positive (+)	Publications of NBS
Socio-economic Factors	Poverty Rate (POV)	Negative (-)	Publications of NBS (Annual Abstract of Statistics for various years)
	Unemployment Rate (UR)	Negative (-)	
Political Factors (POF)	Political Party Affinity with centre ((PAC) = 0 if the Governor belongs to the ruling party at the federal level, otherwise =1)	Negative (-)	INEC, Nigeria
	TERM (= 0, if the Governor is serving his/her first term in office, 1 = if serving second term in office)	Positive (+)	
	Number of years in Office (YEARS)	Positive (+)	Compiled by author from INEC, Nigeria
Fiscal Institutions (BT)	Budget Transparency Index (BTI)	Positive (+)	CIRDDOC, Nigeria
	Public Availability of Key Budget Documents (BAI)	Positive (+)	
	Public Participation Index (PPI)	Positive (+)	
	Public Access to Public Procurement Information (PPRI)	Positive (+)	
Corruption	Control of Corruption at national level (COR)	Positive (+)	World Governance Indicators

Note: NBS = National Bureau of Statistics; INEC = Independent National Electoral Commission.

Source: Author's compilation (2021).

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The regression models are estimated in two forms (extended and restricted) based on the available cross-sectional and panel data sets, using the ordinary least squares (OLS) estimation technique. The extended models, which include poverty (POV), cover only two sample points due to unavailability of data on poverty for one of the years, while restricted models omit the poverty variable (POV) in order to have results covering all the three sample points and all the observations for the years covered by the study. In sum, the restricted models with a larger number of observations serve as a robustness check for the results obtained in the extended models which contain fewer observations. The models are estimated using a data set of all the 36 states of Nigeria, as well as sub-samples of 19 northern and 17 southern states respectively (see table A4 in appendix). The essence is to check the robustness and consistency of the estimated results through comparison between the two regions. In order to ascertain the most appropriate forms of panel data model to fit the data (i.e., Pooled OLS, Fixed Effects and Random Effects models), F-test and Hausman test are conducted in the study. The null hypothesis of the F-test is that there is no heterogeneity in the models, while the null hypothesis of the Hausman (1978) test is that random effect is more appropriate.

The data used for this study are cross-sectional and panel data sets of the 36 states in Nigeria on IGR, population density, poverty rate, unemployment rate, dummy variables representing State Governor's political party affinity with the centre and term in office, and length of years the governor spends in office as measures of political factor and indices of different components of budget transparency for 2015, 2018 and 2020 fiscal years. The scope was dictated by availability of data on budget transparency indices, published by CIRDDOC, Nigeria.

4 DESCRIPTIVE STATISTICS AND CORRELATION ANALYSIS

The descriptive statistics on the dependent and independent variables for the 36 states are presented in table 2. The statistics show that the average share of IGR as percentage of total revenue for all the 36 state governments stands at 23.41 for the selected years considered (i.e., 2015, 2018 and 2020), with a minimum of 5.45 and maximum of 78.33. The wide range is largely explained by the performance of urbanised states including Lagos, Rivers and Delta in the south, where IGR accounts for the bulk of the revenue; and very poor performance of less urbanised states in the north. Similar patterns are discernible with the independent variables, particularly budget transparency. For instance, the average score for overall budget transparency is 32.41, with a minimum score of 7 and maximum of 90 out of 100. The descriptive statistics by region show that the average share of IGR in the total revenue is 17.20 percent in the 19 northern states, with a minimum of 5.45 and maximum of 44.57 (see table A2 in appendix). However, the average share in the southern states is 30.36 percent of the total revenue (see table A1 in appendix). The analysis of the descriptive statistics of the various measures of overall budget transparency by region show an average score of 34.10 and 30.89 in the southern and northern states respectively (see tables A1 and A2). The summary statistics indicate that the southern states have performed relatively well in

both revenue performance and budget transparency. The rather low average scores for both regions however suggest that the budget process at the state level in Nigeria is still shrouded in secrecy despite the increasing pressures from CSOs and international development partners.

The correlation matrix in table 3 indicates a strong positive relationship between population density (PDS) and the share of IGR total revenue. The correlation between the share of IGR and the various indices of budget transparency appear weak but also positive. Public access to procurement information (PPRI) has the highest correlation coefficient of 0.2301 among the three indices.

Table 2

Descriptive statistics for the 36 states

Variable	Obs.	Mean	Std. dev.	Min	Max
SIGR	108	23.41	14.57	5.45	78.33
PDS	108	443.00	613.61	52.93	3885.70
POV	71	53.46	23.72	4.50	88.50
UR	108	31.88	15.10	8.37	64.75
PAC	108	0.39	0.49	0	1
BTI	108	32.41	18.18	7	90
BAI	108	36.00	21.96	5	91
PPI	108	22.64	20.94	0	100
PPRI	108	33.37	22.11	0	100
TERM	108	0.51	0.50	0	1
YEARS	108	3.86	2.24	1	10
COR	108	13.14	0.45	12.50	13.46

Source: Author's computation (2021).

The preliminary insight from the correlation matrix in table 3 is that level of budget transparency and political factors might not be strong determinants of IGR performance of states in Nigeria. The strong correlation between percentage share of IGR (*SIGR*), population density (*PDS*), poverty (*POV*) and unemployment (*UR*) suggest that the socio-economic factors, which include population density, poverty and unemployment, are likely to be responsible for the wide variation in the IGR performance among states. Meanwhile, the correlation among the various measures of budget transparency range between 0.4393 and 0.9262, suggesting a strong, positive relationship among the various measures.

Table 3

Correlation matrix for the 36 states

	SIGR	PDS	POV	UR	PAC	BTI	BAI	PPI	PPRI	TERM	YEARS	COR
SIGR	1											
PDS	0.6413	1										
POV	-0.5486	-0.4022	1									
UR	-0.1121	-0.0242	-0.1872	1								
PAC	0.0254	0.1022	-0.1192	0.0405	1							
BTI	0.2250	0.1588	-0.2235	0.1160	-0.0652	1						
BAI	0.1544	0.0720	-0.2478	0.1394	-0.1095	0.9262	1					
PPI	0.2004	0.2092	-0.0666	-0.0750	-0.0050	0.7420	0.5440	1				
PPRI	0.2301	0.1929	-0.0839	0.1071	0.0185	0.6962	0.4393	0.4875	1			
TERM	-0.0112	-0.0158	0.1469	-0.2382	-0.1288	0.0845	0.0424	0.1621	0.0696	1		
YEARS	-0.0302	-0.0666	-0.2344	0.3799	0.1860	0.0613	0.1549	-0.1400	-0.0563	0.1714	1	
COR	0.1709	0.0417	-0.4607	0.6722	0.0403	0.2461	0.3217	-0.0983	0.1199	-0.2226	0.4757	1

Source: Author's computation (2021).

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5 RESULTS AND DISCUSSION OF FINDINGS

The results of the estimated cross-sectional regression models are presented in table A3 in appendix, while tables 4-6 present the results of the panel data regression models in 14 columns. Table 4 presents the results of the models involving the 36 states. Table 5 contains the results involving the 17 southern states, while table 6 considers the sub-sample of northern states. In the estimated models without the corruption variable, only the most preferred among Pooled OLS, Fixed Effects and Random Effects models are reported. Precisely, the results of the affected models are presented in columns 1-4 of tables 4-6. Incidentally, based on the outcome of the Hausman test, 10 out of the 12 preferred models reported are Random Effects, while 2 are Fixed Effects models. However, the remaining models whose results are presented in columns 5-14 of the tables are all Random Effects due to the inclusion variable on corruption (COR) which only varied with sample points but were invariant across the cross-sectional units. This is because the study adopts the national scores for the states in the three sample points covered by the study.

The baseline results are presented in columns 1-4 of tables 4-6. The results in columns 1-2 of the tables examine the impact of overall budget transparency (BTI) on internal revenue performance, while results in columns 3-4 examine the impacts of three components of budget transparency (i.e., public availability of key budget documents (BAI), public participation (PPI) and public availability of state procurement information (PPRI)) on internal revenue performance. The results presented in columns 5-6 of the tables examine the impacts of overall budget transparency, control of corruption and different measures of political factors on revenue. Meanwhile, columns 7-14 present the results of effects of each measure of budget transparency on revenue mobilisation. This is meant to control for multicollinearity, given the moderate to very high pairwise correlation among the various measures of budget transparency presented in table 3.

The results in tables 4-6 indicate that population density, poverty rate, unemployment and control of corruption are the most consistent and statistically significant determinants of internal revenue performance of state governments in Nigeria. Overall budget transparency (BTI) was also recorded as having significant impact on revenue performance in two of the estimated models involving the 36 states at 5 percent significance level. A similar result was also reported for the variable in the 19 northern states, though at 10 percent significance level in one of the models. Contrarily, only population density and poverty appeared as significant factors in the models involving the sub-sample of the 17 southern states. Looking at the impact of the three components of budget transparency, i.e., public availability of key budget documents (BAI), public participation (PPI) and availability of public procurement information (PPRI) on revenue in table 4, it appears that only the public availability of key budget documents is significant in two of the models involving the 36 states. Public availability of budget documents and availability of public procurement information turn out significant in two and one of the preferred models for the sub-sample of northern states respectively.

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Meanwhile, only the public availability of budget documents was marginally significant at 10 percent significance level in the models involving the sub-sample of southern states. This suggests that budget transparency might have to be comprehensive to have a significant impact on revenue mobilisation. In other words, making budget documents and procurement information available to the public without providing ample opportunities for effective public participation may not have a significant impact on tax compliance and revenue performance.

Only one of the political variables, political party affinity with centre (PAC), appears to be marginally significant in the southern states, but not for models involving the 36 states and the sub-sample of northern states respectively. This is supported by the evidence from the correlation analysis provided in table 2, which indicates a low correlation between revenue performance and each of the political variables. One reason that could be adduced for this result is that fiscal behaviours of the state governments are largely similar irrespective of the ruling political parties or changes in political institutions (Yaru et al., 2014). More so, the state governors are not different in terms of ideologies, even when they belong to different political parties. This is demonstrated by the incessant defection of state governors from one political party to another. In 2014, for example, about five state governors elected under the platform of the People's Democratic Party (PDP) defected to the All Progressives Congress (APC) (Yaru, 2015). Similarly, after the 2019 general elections, the governors of Zamfara, Ebonyi and Akwa-Ibom states who were elected under the platform of PDP defected to the APC[1].

The results of the models that examine the impact of corruption and its interactive effects with the various measures of budget transparency on revenue performance in columns 5-14 of tables 4-6 indicate that control of corruption has a positive and statistically significant influence on domestic revenue mobilisation in almost all the estimated models. However, the interactions between control of corruption and the various measures of budget transparency are not statistically significant in any of the models. This is unexpected from a theoretical perspective but not surprising as the various components of budget transparency are not statistically significant individually and control of corruption variable is common for all the states in each sample point.

The insight from the results of the estimated models is that the variation observed in internal revenue performances among states in Nigeria is largely attributable to economic factors, particularly population density/urbanisation and the prevailing socio-economic conditions (poverty and unemployment rates). Studies with similar findings at national level include Andrejovskà and Pulikovà (2018), which finds that employment rate is one of the strongest drivers of tax revenue in EU countries.

[1] PDP was the ruling party at the national level between 1999 and 2015, while APC was formed in 2013 as coalition party by members of the defunct Action Congress of Nigeria (ACN), All Nigeria People's Party (ANPP), Congress for Progressive Change (CPC), and factions of the People's Democratic Party (PDP) and All Progressives Grand Alliance (APGA) to form a formidable opposition against the PDP in preparation for the 2015 general elections.

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Table 4

Results of panel data regression model for the 36 states

Variables	Random effects[a]	Fixed effect[a]	Random effects[a]		Random effects									
PDS	0.0125***	0.0174	0.0126***	0.0150***	0.0139***	0.0139***	0.0138***	0.0140***	0.0138***	0.0141***	0.0137***	0.0141***	0.0138***	0.0141***
	(0.00273)	(0.0114)	(0.00276)	(0.00270)	(0.00281)	(0.00271)	(0.00282)	(0.00267)	(0.00286)	(0.00271)	(0.00284)	(0.00270)	(0.00273)	(0.00262)
POV	0.149***	-	-0.144***	-	-0.0235	-	-0.0223	-	-0.0199	-	-0.0317	-	-0.0349	-
	(0.0494)		(0.0516)		(0.0539)		(0.0532)		(0.0531)		(0.0542)		(0.0544)	
UR	-0.0439	0.0502	-0.0627	0.0201	-0.227***	-0.152***	-0.201**	-0.155***	-0.203**	-0.155***	-0.202**	-0.165***	-0.234***	-0.170***
	(0.0711)	(0.0428)	(0.0756)	(0.0415)	(0.0820)	(0.0582)	(0.0830)	(0.0582)	(0.0803)	(0.0584)	(0.0876)	(0.0572)	(0.0865)	(0.0576)
BTI	0.140***	0.133***	-	-	-	-	0.885	0.501	-	-	-	-	-	-
	(0.0536)	(0.0384)					(1.316)	(0.907)						
BAI	-	-	0.0920*	0.0916***	0.0317	0.0300	-	-	0.998	0.562	-	-	-	-
			(0.0498)	(0.0334)	(0.0509)	(0.0344)			(1.086)	(0.818)				
PPI	-	-	-0.0224	-0.0263	-0.00936	0.0171	-	-	-	-	0.670	-	-	-
			(0.0544)	(0.0415)	(0.0538)	(0.0396)					(1.333)			
PPRI	-	-	0.0612	0.0481	0.0529	0.0224	-	-	-	-	-	-	0.0657	0.447
			(0.0515)	(0.0369)	(0.0452)	(0.0341)							(0.995)	(0.703)
PAC	-0.947	-1.836	-0.855	-1.547	-0.841	-1.297	-1.397	-1.244	-1.320	-1.132	-1.741	-1.411	-0.949	-1.265
	(1.663)	(1.257)	(1.690)	(1.257)	(1.705)	(1.203)	(1.738)	(1.180)	(1.683)	(1.180)	(1.998)	(1.197)	(1.684)	(1.223)
TERM					2.251	0.727	1.771	0.699	2.097	0.860	0.670	0.833	2.301	0.710
					(2.344)	(1.157)	(2.202)	(1.146)	(2.167)	(1.136)	(1.333)	(1.186)	(2.169)	(1.179)
YEARS					-0.444	-0.224	-0.295	-0.221	-0.389	-0.280	-0.210	-0.217	-0.376	-0.200
					(0.443)	(0.298)	(0.433)	(0.289)	(0.407)	(0.286)	(0.514)	(0.299)	(0.429)	(0.297)
COR					10.01***	8.329***	11.62***	9.208***	12.58***	9.558***	11.53***	9.071***	10.44***	9.941***
					(2.739)	(1.916)	(3.943)	(2.742)	(3.851)	(2.680)	(3.025)	(2.138)	(3.394)	(2.490)
BTI*COR							-0.0629	-0.0331	-	-	-	-	-	-
							(0.102)	(0.0689)						
BAI*COR							-	-	-0.0733	-0.0393	-	-	-	-
									(0.0839)	(0.0620)				
PPI*COR							-	-	-	-	-0.0492	0.0109	-	-
											(0.103)	(0.0571)		
PPRI*COR							-	-	-	-	-	-	-0.000471	-0.0311
													(0.0772)	(0.0538)

Variables	Random effects[a]	Fixed effect[a]	Random effects[a]		Random effects									
Constant	22.83***	10.51**	22.66***	12.43***	-107.7***	-88.56***	-128.6**	-99.93***	-140.3***	-103.9***	-125.6***	-96.80***	-112.0**	-108.3***
	(4.841)	(4.768)	(4.910)	(2.646)	(35.50)	(23.31)	(51.20)	(34.62)	(49.80)	(33.78)	(39.90)	(26.87)	(44.97)	(31.52)
Observations	71	108	71	108	71	108	71	108	71	108	71	108	71	108
Number of states	36	36	36	36	36	36	36	36	36	36	36	36	36	36
R-squared	0.533	0.262	0.535	0.438	0.528	0.503	0.515	0.500	0.509	0.495	0.531	0.506	0.545	0.506
F/Wald Chi^2 statistic	67.27***	6.02***	66.66***	52.49***	90.90***	77.41***	92.08***	78.48***	92.0***	77.31***	87.77***	75.93***	90.00***	76.81***
F-test for homogeneity														
Hausman test	6.09[0.297]	20.52***[0.000]	9.44[0.222]	9.54[0.145]										

[a] *Preferred Model based on Hausman test; Standard errors in parentheses; p-values in brackets; *** p<0.01, ** p<0.05, * p<0.1.*

Source: Author's computation (2021).

Table 5

Results of panel data regression model for the 17 Southern states

Variables	Random effect[a]	Fixed effect[a]	Random effects[a]		Random effects									
PDS	0.0108***	0.0114	0.0107***	0.0123***	0.0115***	0.0119***	0.0115***	0.0119***	0.0117***	0.0119***	0.0117***	0.0120***	0.0115***	0.0124***
	(0.00399)	(0.0122)	(0.00409)	(0.00399)	(0.00410)	(0.00409)	(0.00411)	(0.00410)	(0.00395)	(0.00407)	(0.00408)	(0.00410)	(0.00402)	(0.00395)
POV	-0.126**	-	-0.133**	-	-0.0507	-	-0.0228	-	-0.0242	-	-0.0163	-	-0.0411	-
	(0.0623)		(0.0647)		(0.0999)		(0.0919)		(0.0952)		(0.0926)		(0.0943)	
UR	-0.0286	0.0508	-0.0361	-0.00856	-0.164	-0.176	-0.182	-0.161	-0.188	-0.149	-0.185	-0.179	-0.167	-0.202*
	(0.0824)	(0.0702)	(0.0895)	(0.0646)	(0.125)	(0.112)	(0.119)	(0.119)	(0.126)	(0.115)	(0.119)	(0.119)	(0.118)	(0.114)
BTI	0.0363	0.0396	-	-	-	-	0.392	-0.450	-	-	-	-	-	-
	(0.0588)	(0.0467)					(1.720)	(1.210)						
BAI	-	-	0.0456	0.0817*	0.0440	0.0745	-	-	0.375	-0.554	-	-	-	-
			(0.0537)	(0.0424)	(0.0647)	(0.0454)			(1.296)	(1.014)				
PPI	-	-	0.0233	-0.0379	-0.0212	-0.0356	-	-	-	-	-1.152	-0.250	-	-
			(0.0569)	(0.0497)	(0.0684)	(0.0504)					(2.181)	(1.048)		
PPRI	-	-	-0.0442	-0.0378	-0.0317	-0.0518	-	-	-	-	-	-	1.119	0.749
			(0.0524)	(0.0441)	(0.0537)	(0.0431)							(1.341)	(1.022)
PAC	-2.623	-3.233*	-2.646	-2.865*	-0.968	-1.567	-1.845	-1.987	-1.723	-1.842	-0.830	-1.985	-1.980	-2.170
	(1.647)	(1.587)	(1.695)	(1.521)	(2.163)	(1.681)	(2.035)	(1.685)	(2.004)	(1.658)	(2.343)	(1.718)	(1.884)	(1.671)
TERM	-	-	-	-	4.427	0.735	3.722	0.418	3.678	0.572	4.098	0.403	4.304	0.486
					(3.494)	(1.516)	(3.183)	(1.583)	(3.287)	(1.558)	(3.341)	(1.647)	(3.088)	(1.567)
YEARS	-	-	-	-	-0.864	-0.428	-0.559	-0.236	-0.578	-0.298	-0.889	-0.225	-0.535	-0.181
					(0.637)	(0.387)	(0.567)	(0.391)	(0.549)	(0.383)	(0.697)	(0.401)	(0.522)	(0.382)
COR	-	-	-	-	7.654	6.251**	10.34	5.458	10.19	4.712	7.626	6.525	11.86**	9.845**
					(5.233)	(3.148)	(6.647)	(4.650)	(6.511)	(4.167)	(5.715)	(3.995)	(5.591)	(4.344)
BTI*COR	-	-	-	-	-	-	-0.0301	0.0359	-	-	-	-	-	-
							(0.134)	(0.0929)						
BAI*COR	-	-	-	-	-	-	-	-	-0.0280	0.0450	-	-	-	-
									(0.100)	(0.0772)				
PPI*COR	-	-	-	-	-	-	-	-	-	-	0.0895	0.0187	-	-
											(0.170)	(0.0808)		
PPRI*COR	-	-	-	-	-	-	-	-	-	-	-	-	-0.0884	-0.0601
													(0.104)	(0.0786)

Variables	Random effect[a]	Fixed effect[a]	Random effects[a]		Random effects									
Constant	28.84***	21.07**	29.91***	22.72***	-69.76	-52.85	-105.5	-44.18	-103.8	-35.27	-70.27	-56.78	-124.1*	-98.78*
	(6.455)	(8.340)	(6.568)	(4.861)	(68.95)	(38.59)	(85.44)	(58.34)	(83.98)	(52.19)	(74.58)	(49.96)	(73.78)	(54.87)
Observations	34	51	34	51	34	51	34	51	34	51	34	51	34	51
Number of states	17	17	17	17	17	17	17	17	17	17	17	17	17	17
R-squared	0.403	0.245	0.385	0.376	0.431	0.430	0.453	0.448	0.453	0.443	0.454	0.449	0.427	0.435
F/Wald Chi^2 statistic	28.46***	2.43*	28.68***	22.62***	34.57***	27.85***	34.91***	23.80***	33.65***	25.30***	35.54***	23.51***	37.01***	25.55***
F-test for homogeneity														
Hausman test	3.17[0.673]	11.83**[0.018]	4.55[0.714]	3.44[0.751]										

[a] *Preferred Model based on Hausman test; Standard errors in parentheses; p-values in brackets; *** p<0.01, ** p<0.05, * p<0.1.*

Source: Author's computation (2021).

Table 6

Results of panel data regression model for the 19 Northern states

Variables	Random effects[a]				Random effects									
PDS	0.0107	0.0164	0.0136	0.0198*	0.0102	0.0146	0.00880	0.0146	0.00847	0.0159*	0.00951	0.0137	0.0114	0.0153
	(0.00948)	(0.0109)	(0.0103)	(0.0113)	(0.0108)	(0.0106)	(0.00933)	(0.00922)	(0.00960)	(0.00950)	(0.00909)	(0.0101)	(0.00864)	(0.00941)
POV	-0.240***	-	-0.214***	-	-0.122	-	-0.140*	-	-0.134	-	-0.151*	-	-0.194**	-
	(0.0695)		(0.0709)		(0.0802)		(0.0798)		(0.0822)		(0.0807)		(0.0815)	
UR	0.0581	0.0513	0.0743	0.0452	-0.0439	-0.123*	-0.0737	-0.122*	-0.0521	-0.115	-0.0209	-0.120*	-0.158	-0.136**
	(0.120)	(0.0542)	(0.115)	(0.0536)	(0.128)	(0.0703)	(0.140)	(0.0709)	(0.134)	(0.0715)	(0.135)	(0.0705)	(0.135)	(0.0690)
BTI	0.140*	0.178***	-	-	-	-	-0.357	0.671	-	-	-	-	-	-
	(0.0774)	(0.0541)					(2.339)	(1.756)						
BAI	-	-	0.126*	0.117**	0.0725	0.0199	-	-	-0.122	1.044	-	-	-	-
			(0.0664)	(0.0472)	(0.0734)	(0.0497)			(2.032)	(1.399)				
PPI	-	-	-0.132*	-0.0598	-0.0827	0.00957	-	-	-	-	-0.167	-1.206	-	-
			(0.0796)	(0.0661)	(0.0844)	(0.0640)					(2.188)	(1.560)		
PPRI	-	-	0.113*	0.105*	0.0840	0.0720	-	-	-	-	-	-	-1.928	-0.248
			(0.0667)	(0.0535)	(0.0671)	(0.0494)							(1.595)	(1.062)
PAC	1.098	-0.300	-0.267	-0.676	-1.719	-0.960	-1.534	-0.597	-1.742	-0.316	-2.301	-0.488	-2.066	-1.443
	(2.681)	(2.039)	(2.618)	(2.050)	(2.848)	(1.892)	(3.007)	(2.002)	(2.991)	(1.971)	(3.253)	(1.899)	(2.905)	(2.068)
TERM	-	-	-	-	-0.723	0.403	1.601	0.346	-1.352	0.812	-0.659	1.437	-2.084	0.381
					(2.721)	(1.732)	(2.652)	(1.871)	(2.559)	(1.767)	(2.881)	(2.007)	(2.423)	(1.760)
YEARS	-	-	-	-	-0.0712	-0.186	-0.0783	-0.231	-0.0513	-0.345	-0.0376	-0.444	-0.239	-0.188
					(0.554)	(0.447)	(0.646)	(0.468)	(0.629)	(0.445)	(0.711)	(0.498)	(0.593)	(0.450)
COR	-	-	-	-	6.304*	9.218***	6.755	10.44***	7.366	12.03***	8.341**	9.346***	3.160	9.164***
					(3.415)	(2.567)	(5.490)	(3.838)	(5.759)	-	(4.141)	(2.785)	(4.528)	(3.130)
BTI*COR	-	-	-	-	-	-	0.0320	-0.0448	-	-	-	-	-	-
							(0.179)	(0.131)						
BAI*COR	-	-	-	-	-	-	-	-	0.0124	-0.0758	-	-	-	-
									(0.157)	(0.106)				
PPI*COR	-	-	-	-	-	-	-	-	-	-	0.0106	0.0940	-	-
											(0.166)	(0.116)		

Variables	Random effects[a]				Random effects									
PPRI*COR	-	-	-	-	-	-	-	-	-	-	-	-	0.155	0.0247
													(0.124)	(0.0806)
Constant	25.11***	7.092**	21.95***	6.069*	-59.54	-104.8***	-61.15	-120.2**	-69.63	-140.3***	-80.32	-103.6***	-9.591	-103.0***
	(5.913)	(3.134)	(6.047)	(3.197)	(44.19)	(31.13)	(72.21)	(49.38)	(74.48)	(49.53)	(55.00)	(35.38)	(60.61)	(39.88)
Observations	37	57	37	57	37	57	37	57	37	57	37	57	37	57
Number of states	19	19	19	19	19	19	19	19	19	19	19	19	19	19
R-squared	0.305	0.048	0.277	0.053	0.380	0.126	0.498	0.124	0.472	0.104	0.483	0.171	0.602	0.162
F/Wald Chi^2 statistic	28.99***	19.25***	40.27***	22.47***	48.52***	43.18***	36.76***	36.40***	36.45***	36.57***	34.05***	39.00***	40.26***	40.14***
F-test for homogeneity														
Hausman test	4.94[0.423]	9.07*[0.059]	13.1*[0.069]	2.54[0.864]										

[a] *Preferred Model based on Hausman test; Standard errors in parentheses; p-values in brackets; *** p<0.01, ** p<0.05, * p<0.1.*

Source: Author's computation (2021).

The findings also point out that factors that explain revenue mobilisation in a diverse country like Nigeria may vary along the regional divide. For example, population density is a major factor in the south, while poverty rate and unemployment are the strongest determinants of revenue mobilisation in the northern states. On the components of budget transparency, only overall budget transparency Index (BTI) and public availability of key budget documents (BAI) appear statistically significant in a few of the estimated models for the 36 states and the northern states. For the southern states, only BAI is marginally significant at 10 percent significance level. The results do not change even when multicollinearity is controlled for by examination of the impacts of each component in isolation, given the high correlation among them in table 3. The result could be due to the unstable progress made by the states in budget transparency. Meanwhile, with respect to corruption, the finding confirms previous works by Ghura (1998), Ajaz and Ahmad (2010), and Yaru and Raji (2022), which indicated that prevalence of corruption (control of corruption) has a negative (positive) and statistically significant effect on tax revenue performance.

In terms of a-priori expectations, all the coefficients of economic and socioeconomic variables (i.e., population density, poverty rate and unemployment) and the control of corruption conform to the expected signs in all the models. The overall significance/explanatory powers of the respective econometric models gauged by the reported F-statistics and R^2, respectively, suggest that all the models are significant and satisfactorily explain the variation in internal revenue performance of states. The R^2s of the estimated models range between 4.8 and 60.2 percent.

The results of the cross-sectional regression models presented in table A3 in appendix largely conform to the estimated panel data regression models. The results support the dominant roles of the economic factors in domestic revenue performance at sub-national level. However, contrary to the panel data models, only one component of budget transparency, i.e., public access to procurement information, appeared marginally statistically significant at 10 percent level of significance in only one of the three estimated extended models. The cross-sectional models could not accommodate the corruption variable since yearly national scores on control of corruption were used for all the states in the years covered.

6 CONCLUSION

This study examines whether or not the hypothesis that a transparent budget process results in improved revenue performance has empirical support at the sub-national level in Nigeria. Both state-level cross-sectional and panel data sets are used to test the hypothesis. The descriptive statistics suggest that on the average, both budget transparency and internal revenue mobilisation are low at the sub-national level. However, the findings from the panel data econometric analysis show that overall budget transparency has a positive and significant impact on domestic revenue mobilisation by the states. Thus, the tested hypothesis cannot be rejected, but it appears that socio-economic factors, which include population

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density (urbanisation), poverty and unemployment, are the most consistent and dominant determinants of revenue mobilisation in all the models. The study concludes that domestic revenue mobilisation by a sub-national (state) government in Nigeria depends largely on the extent to which it increases the size of its economic base (volume of economic activities), creates employment opportunities, succeeds in fighting poverty within its jurisdiction and improves in its overall budget transparency. The study also reiterates the need to control corruption in order to make sustainable progress in revenue mobilisation at the sub-national level.

Disclosure statement

The author does not have any financial or substantive conflict of interest that might be construed as influencing the results or interpretation of his manuscript.

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APPENDIX

Table A1

Descriptive statistics for the 17 Southern states

Variable	Obs.	Mean	Std. dev.	Min	Max
SIGR	51	30.36	16.91	8.18	78.33
PDS	51	737.01	785.35	172.39	3885.7
POV	34	38.81	21.55	4.5	82.9
UR	51	30.17	15.13	9.38	57.96
PAC	51	0.61	0.49	0	1
BTI	51	34.10	18.09	7	79
BAI	51	36.24	23.13	5	86
PPI	51	25.80	21.27	0	78
PPRI	51	36.86	21.47	2	100
TERM	51	0.53	0.50	0	1
YEARS	51	3.92	2.18	1	8
COR	51	13.14	0.46	12.5	13.46

Source: Author's computation (2021).

Table A2

Descriptive statistics for the 19 Northern states

Variable	Obs.	Mean	Std. dev.	Min	Max
SIGR	57	17.20	8.16	5.45	44.57
PDS	57	179.94	139.82	52.93	735.81
POV	37	66.92	16.72	20.35	88.5
UR	57	33.41	15.03	8.37	64.75
PAC	57	0.19	0.40	0	1
BTI	57	30.89	18.28	7	90
BAI	57	35.79	21.06	8	91
PPI	57	19.79	20.40	0	100
PPRI	57	30.25	22.38	0	93
TERM	57	0.49	0.50	0	1
YEARS	57	3.81	2.31	1	10
COR	57	13.14	0.46	12.5	13.46

Source: Author's computation (2021).

Table A3
Cross-sectional regression results

Explanatory variables	Estimates based on 2020 data set		Estimates based on 2018 data set		Estimates based on 2015 data set	
	Model IA	**Model IIA**	**Model IB**	**Model IIB**	**Model IC**	**Model IIC**
			Dependent variable = SIGR			
Constant Intercept	34.6379*** (7.3127)	37.5208*** (7.3088)	32.0305*** (9.5070)	33.0906*** (10.1008)	28.1200*** (8.6623)	28.3605*** (9.1120)
PDS	0.0115*** (0.0029)	0.0109*** (0.0029)	0.0127*** (0.0034)	0.0122*** (0.0036)	0.0161*** (0.0034)	0.0153*** (0.0038)
POV	-0.1722** (0.0714)	-0.1960** (0.0703)				
UR	-0.2674* (0.1422)	-0.3058** (0.1407)	-0.3740* (0.1937)	-0.3873* (0.2006)	-0.7740* (0.3954)	-0.7755* (0.4120)
PAC	1.0320 (3.9323)	-1.2514 (4.0456)	-4.3758 (4.0154)	-4.7116 (4.1953)	-1.5324 (3.8702)	-1.6115 (4.0812)
BTI	0.0765 (0.1282)		0.1185 (0.1076)		-0.0231 (0.1057)	
BAI		-0.0785 (0.1157)		0.0162 (0.1175)		-0.0660 (0.1262)
PPI		-0.0115 (0.1345)		0.0620 (0.1229)		0.0494 (0.1177)
PPRI		0.2064* (0.1017)		0.0542 (0.1035)		-0.0003 (0.0978)
	No. of obs. = 35 Df (5,29) $R^2 = 0.5624$ Adj. $R^2 = 0.4869$ $F(5, 29) = 7.45$ Prob > F = 0.0001	No. of obs. = 35 Df (7,27) $R^2 = 0.6201$ Adj. $R^2 = 0.5216$ $F(7, 27) = 6.29$ Prob > F = 0.0002	No. of obs. = 36 Df (4,31) $R^2 = 0.4820$ Adj. $R^2 = 0.4152$ $F(4, 31) = 7.21$ Prob > F = 0.0003	No. of obs. = 36 Df (6,29) $R^2 = 0.4877$ Adj. $R^2 = 0.3817$ $F(6, 29) = 4.60$ Prob > F = 0.0021	No. of obs. = 36 Df (4,31) $R^2 = 0.5503$ Adj. $R^2 = 0.4943$ $F(4, 31) = 9.48$ Prob > F = 0.0000	No. of obs. = 36 Df (6,29) $R^2 = 0.5546$ Adj. $R^2 = 0.4624$ $F(6, 29) = 6.02$ Prob > F = 0.0004

*Note: Standard error in parentheses; p-values in brackets; *** p<0.01, ** p<0.05, * p<0.1.*

Source: Author's computation (2021).

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TABLE A4

The 36 states in Nigeria

Sub-sample of 17 Southern States	Sub-sample of 19 Northern States
Abia	Adamawa
Akwa-Ibom	Bauchi
Anambra	Benue
Bayelsa	Borno
Cross River	Gombe
Delta	Jigawa
Ebonyi	Kaduna
Edo	Kano
Ekiti	Katsina
Enugu	Kebbi
Imo	Kogi
Lagos	Kwara
Ogun	Nasarawa
Ondo	Niger
Osun	Plateau
Oyo	Sokoto
Rivers	Taraba
	Yobe
	Zamfara

Source: Compiled by author based on the geographical locations of the states.