Universidade do Minho
Escola de Economia e Gestão

Kayode Olugbenga Taiwo

Fiscal Decentralisation, Intergovernmental Transfers, and Human Development

agosto de 2020

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UMinho | 2020

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Fiscal Decentralisation, Intergovernmental Transfers, and Human Development

Ph.D. Thesis
Ph.D. in Economics

A work done under the supervision of
Professor Linda Gonçalves Veiga
Professor Miguel Ângelo dos Reis Portela

agosto de 2020

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Acknowledgements

First and foremost, I want to thank my thesis advisors. I thank Professor Linda Veiga, Professor Miguel Portela, and Professor Ivo Bischoff of the University of Kassel (Uni-Kassel), Germany. I sincerely appreciate your invaluable comments, constructive criticism, mentorship, encouragement, and support both in cash and in kind. Having passed through your test of fire, you have produced a fine steel!

My gratitude goes to the Department of Informatics, University of Minho for a research fellowship during my studies. The same goes for the United Nations University Operating Unit on Policy-Driven Electronic Governance (UNU-EGOV) for the visiting fellowship granted to me in the course of this study. I sincerely thank the Director of UNU-EGOV, Professor D. Soares and her team for the impactful time spent with them. Credit also goes to the Department of Economics, University of Minho for support at different times. I thank ERASMUS/University of Minho for supporting my research stay at Uni-Kassel, Germany.

I am grateful to Professor T. Obamuyi for supporting my nomination for TETFund scholarship. I sincerely appreciate and thank Professor Femi Mimiko, the former Vice-Chancellor of Adekunle Ajasin University, Akungba (AAUA), Nigeria for approving my nomination. Professor Mimiko's words of encouragement and support have been very helpful and motivating. Also, I will like to thank Professor E. Ogunbadewa, Professor S. Olorunfemi, Professor (Mrs) M. M. Fasoranti, Dr B. Fatukasi, and Dr C. Ofonyelu. My gratitude also goes to other members of the Department of Economics, AAUA.

Special gratitude goes to my teacher, friend, and mentor, Mr F. Aluko, for his inestimable support. Also, deserving of special mention are Mr S. Oyelesi, Mr N. Oyelesi, Ms G. Mai and Mr D. Kopp, Baba T. Somorin, and Pastor D. Loop. I thank you for your support and words of encouragement. Due credit goes to Mr A. Oduleye of JTB and Alhaji T. A. Aliyu of RMAFC for sharing institutional information with me.

My special gratitude goes to my family, in-laws, friends, colleagues, and well-wishers, who are too numerous to mention. However, the support and encouragement of Mrs Abosede Ladejobi deserve special recognition. Thanks a million for standing by me at turbulent periods!

My nuclear family earns a special appreciation for tolerating and sharing the burden of the turbulent period of the PhD program with me. This award is yours! My thanks go to Bolanle, my darling wife. Special gratitude goes to my children, Aridunnu and Ariyo for enduring the turbulence of the PhD program with me. I promise you special attention and care going forward. I dedicate this work to the memory of my late parents, Mr Abiodun and Mrs Comfort Taiwo, who helped me to lay the foundation for this accomplishment. To God be all the glory for His grace and mercy to finish the race!

STATEMENT OF INTEGERITY

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Abstract

This study looks at the working of fiscal decentralisation and intergovernmental transfers. The research involves two location-specific studies on Nigeria, while the third study looks at the impact of decentralisation in relation to human development from a cross-country perspective. Though theories suggest intergovernmental transfers should be based on equity and efficiency considerations, studies have established that intergovernmental transfers are laced with influence and control over the grant-receiving governments in a federal state. With a dearth of empirical research on the situation in Nigeria, the first study explores the extant formula-based intergovernmental transfer arrangement under the control of a constitutionally recognised institutional body. Employing both static and dynamic panel data approaches, the finding from the study does not support equity consideration in intergovernmental transfers in Nigeria. The results suggest the existence of strategic and tactical manipulation of intergovernmental transfers by the executive in power for political gains.

Still, on Nigeria, theories predict that intergovernmental transfers from the central government to subnational governments lead to a lower effort in own revenue generation by the subnational governments. Due to the free flow of transfers to subnational governments, transfers are treated as a tax reduction for the residents of recipient subnational jurisdictions. This study, exploiting variation in own revenues using panel data estimators and instrumental variables (IV) approach, finds that the subnational governments in Nigeria behave according to theoretical postulations. States in Nigeria depend majorly on transfers from the central government. The behaviour of the subnational governments is attributed to the political economy of decentralisation in Nigeria, resource dependence, the dominance of the informal sector at subnational jurisdictions, and incomplete decentralisation.

Lastly, availability and improvement in access to water and sanitation services are highly susceptible to environmental factors. The provision of water and sanitation services are bound to be different across jurisdictions due to cost and quality considerations occasioned by environmental realities. This makes the adoption of decentralisation in meeting the provision of these services suitable as decentralisation has been found to be effective in tailoring services to preferences and tastes of local jurisdictions. In view of this, this study tests the impact of decentralisation on access to improved water and sanitation services. The study adopts a static panel data approach in econometric estimation. The empirical results suggest a positive impact of decentralisation on improved access to water and sanitation services.

Descentralização fiscal, transferências intergovernamentais e desenvolvimento humano

Resumo

A presente dissertação aborda os temas da descentralização fiscal e das transferências intergovernamentais. Esta engloba dois estudos focados no caso específico da Nigéria, e um terceiro, que analisa o impacto da descentralização no desenvolvimento humano num contexto multinacional. Apesar das transferências intergovernamentais serem teoricamente determinadas por critérios de equidade e eficiência, os estudos sobre a matéria concluem que estas são suscetíveis a influências políticas. Sendo escassa a análise focada no caso nigeriano, o primeiro estudo da presente dissertação explora as transferências intergovernamentais determinadas por fórmula, controladas por um corpo institucional reconhecido pela Constituição. Utilizando dados em painel e modelos econométricos para painéis estáticos e painéis dinâmicos, o estudo não suporta a vigência de critérios de equidade na alocação das transferências, sugerindo a existência de uma manipulação estratégica das mesmas por parte do poder executivo por forma a obter ganhos políticos.

A teoria prevê também que as transferências do governo central para os governos subnacionais possam conduzir a um menor esforço na obtenção de receitas próprias por parte dos últimos. O livre fluxo das transferências para os governos subnacionais, pode levar a que as transferências funcionem como reduções de impostos aos residentes. Esta hipótese teórica é corroborada empiricamente, num estudo que utiliza uma abordagem baseada quer em dados em painel quer em variáveis instrumentais. Os estados nigerianos dependem largamente das transferências do governo central, sendo o comportamento dos governos subnacionais um resultado da economia política da descentralização na Nigéria, da dependência de recursos, da dominância do setor informal nas jurisdições subnacionais e da descentralização incompleta.

Por último, a disponibilidade e as melhorias no acesso à água e ao saneamento são altamente suscetíveis a fatores ambientais, sendo o seu fornecimento variável entre jurisdições, de acordo com os custos e restrições de qualidade adjacentes aos diferentes contextos ambientais. Esta realidade faz com que a descentralização do fornecimento destes serviços seja adequada, permitindo que os serviços sejam fornecidos à medida do contexto e das preferências de cada jurisdição. A análise efetuada, com recurso a modelos estáticos de dados em painel, sugere que a descentralização tem um impacto positivo no acesso a serviços de água e saneamento.

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List of Abbreviations

2SLS	Two-Stage Least Squares
AC	Action Congress
ACN	Action Congress of Nigeria
ACGSF	Agricultural Credit Guarantee Scheme Fund
AMS	Arrow-Musgrave-Samuelson
ANPP	All Nigeria People's Party
APC	All Progressive Congress
CBN	Central Bank of Nigeria
CCPI	Composite Consumer Price Index
CIT	Company Income Tax
CPC	Congress for Progressive Change
DGP	Data Generating Process
DMPS-OLS	Defence Meteorological Satellite Program/Operational Linescan System
EDS	Educationally Developed States
ELDS	Educationally Less Developed States
EPA	Environmental Protection Agency
FAAC	Federal Account Allocation Committee
FCT	Federal Capital Territory
FE	Fixed Effects
FRA	Fiscal Responsibility Act
GDP	Gross Domestic Product
GFS	Government Finance Statistics
GLS	Generalised Least Squares
GMM	Generalised Method of Moments
ICRG	International Country Risk Guide
IMF	International Monetary Fund
INEC	Independent National Electoral Commission
ISORA	International Survey on Revenue Administration
IV	Instrumental Variables
JAMB	Joint Admission and Matriculation Board
JMP	Joint Monitoring Program
JTB	Joint Tax Board
KOF	Swiss Economic Institute (Konjunkturforschungsstelle)

MDAs	Ministries, Departments, and Agencies
MDGs	Millennium Development Goals
MFD	Measures of Decentralisation
NBS	National Bureau of Statistics
NOAA	National Oceanic and Atmospheric Administration
OAGF	Office of the Accountant General of the Federation
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary Least Squares
OPS	Oil Producing States
PAYE	Pay as You Earn
PDP	People's Democratic Party
PIT	Personal Income Tax
RE	Random Effects
RMAFC	Revenue Mobilisation Allocation and Fiscal Commission
RMSE	Root Mean Square Error
SCN	Supreme Court of Nigeria
SDGs	Sustainable Development Goals
SGMM	System Generalised Method of Moments
SMC	Supreme Military Council
UN	United Nations
UNICEF	United Nations Children's Education Fund
US	United States of America
VAT	Value Added Tax
WASH	Water, Sanitation, and Hygiene
WB	World Bank
WDI	World Bank Development Indicators
WHO	World Health Organisation

Chapter I: Introduction

Fiscal decentralisation involves the transferring of fiscal powers from the centre to lower levels of government. It is basically about the structure of the public sector either in a nominally federal or unitary state. Decentralisation is employed to improve the performance of the public sector, accelerate development, tailor public outputs towards local needs and bring government closer to the governed. A major gain in decentralisation is the improvement in the level of welfare attainable by tailoring public goods and services to local preferences (Oates, 1972, 1999). This is because the major burden of the jurisdictional governments is the provision of goods and services that suit the preferences of their jurisdictions. This governance architecture ensures efficiency in provisions of public goods and services. It brings about the required jurisdictional competition in public services which brings about the efficiency of the system of decentralisation. Thus, transferring fiscal powers to local people to run their governments and provide public goods and services that suit their jurisdictions may help to accelerate development. Many multilateral institutions may have advocated decentralised governance due to the potential efficiency gain arising from decentralisation (Smoke, Loffler & Bosi, 2013). Also, decentralisation douses tension in multicultural societies where there are significant ethnic, cultural, or linguistic differences and helps to maintain unity (Inman & Rubinfeld, 2013).

Fiscal decentralisation comes with the need for intergovernmental transfers. This is to ensure that governments at different levels provide adequate public goods and services for their jurisdictions and meet their cost of operations. The intergovernmental transfer arises out of the challenges of tax-assignment in decentralised states. Because of capacity, cost, and efficiency, the central government is handed most fecund tax-income sources in many cases. This makes more money available at the centre and necessitates the need for intergovernmental transfers. Besides, the success of the system of decentralisation is hinged mainly on the adequacy of resources at subnational levels to produce goods and services that meet the needs of the population. The intergovernmental transfer system is set up to ensures the adequacy of resources at the subnational levels, but most challenges with fiscal decentralisation stem from intergovernmental transfers. This has led to the expression of worries about decentralisation. It has been observed that decentralisation is desirable only after a certain threshold of development has been achieved[1] since it, most times, involves the transfer of resources from the central government to subnational levels. This may have informed the position that decentralisation may bring about local capture (Reinikka &

[1] This has been described as Bahl-Linn thesis in Oates (1993).

Svensson, 2004). This occurs when the local elites corner resources transferred to subnational governments for developmental purposes for their narrow interests (Oates, 1993; Prud'homme, 1995). Excessive fragmentation resulting from decentralisation sometimes leads to loss of economies of scale in the production of services. These undesirable outcomes of decentralisation may have informed the view that the process of implementing decentralisation can be as important as the design of the system in influencing service delivery outcomes (Ahmad, Devaranjan, Khemani & Shah, 2006).

Though intergovernmental transfers should be made on the bases of efficiency and equity (Musgrave, 1999; Oates, 1972, 1999, 2005), studies have established inherent political considerations in intergovernmental transfers (Cox & McCubbins, 1986; Lindbeck & Weibull, 1987; Pinho & Veiga, 2007; Caldeira, 2011; Kauder, Portrafke & Reischmann, 2016). The intergovernmental transfer is sometimes used for political patronage as parties in power tend to favour jurisdictions where they are in control (Veiga, 2012) or jurisdictions that the party in power is expected to capture in future. Sometimes, party in power targets swing voters with transfers. With the political motives driving the flow of intergovernmental transfers from the central government to subnational governments, it becomes difficult to eliminate common pool problem and make the subnational governments face hard budget constraints. This creates incentives for the subnational governments to accumulate debts because the probability of bailout by the central government is high. Without hard budget constraints, subnational governments may run deficit budgets to demonstrate that they lack adequate funds to implement their programs. de Mello (2000) submits that inefficient intergovernmental fiscal coordination among various tiers of government will lead to debt problem and, in the long run, macroeconomic instability. Goodspeed (2002) has shown that subnational governments have incentives to accumulated debts in a two-period model. In the first period, subnational governments may incur debts which constraint the welfare level in the next period. Because the probability of re-election of the central government rests on the welfare level in all subnational jurisdictions, this forces the central government to bailout subnational governments in the second period. This is reasonable on the part of the jurisdictional governments since the marginal cost of the central government is distributed over the whole federation, whereas the benefits are concentrated in the domain of each subnational government (Weingast, Shepsle & Johnsen, 1981).

Arising from the above, this study on fiscal decentralisation is motivated by the fact that decentralisation is still an evolving issue. Various countries at one time or the other restructure their public sectors. The restructuring changes the degree of decentralisation with the hope of improving on the results achieved through decentralisation. Certain centralised functions may be devolved to subnational governments. On

the other hand, the central government may take over some functions from subnational governments. At the centre of decentralisation is the fiscal decision-making across levels of government. This interaction of different tiers of government at the fiscal space has significant implications for development. Besides, the problem of incomplete fiscal decentralisation which affects the behaviour of governments is a major problem hindering development in many decentralised states.

First and foremost, the primary objective of this study is to contribute to the growing literature on fiscal decentralisation. Hence, this study explores issues of political targeting and transfer dependency bedevilling intergovernmental transfers with two location-specific studies on Nigeria. The problem of political targeting is associated with the grant-giving government in an environment where transfers are discretionary or form the bulk of subnational governments' revenues. Because the grant-giving governments have devised means of manipulating the grant-receiving governments for political gains with grave implications for governance, institutional mechanisms of intergovernmental allocation formulae and an allocation agency have been developed to check the problem of political targeting (Khemani, 2007). However, studies suggest that the institutional mechanisms are not foolproof measures to political targeting in intergovernmental transfers (Khemani, 2007; Allers & Ishemoi, 2011; Banful, 2011). With the formula-based system in operation in Nigeria, this study examines the compliance of this system of allocation to the normative theories of equity and efficiency in intergovernmental transfers in Nigeria. Exploiting the variation in intergovernmental transfers to the thirty-six autonomous subnational second-level administrative units using both static and dynamic panel data estimators, findings from this study do not support equity consideration but strategic and political considerations in intergovernmental transfers in Nigeria. This is not quite surprising in the case of Nigeria, given that equality is the largest determinant (40 percent) of transfers to any subnational government regardless of other peculiarities. The existing formula-based transfer mechanism is not fair as equality is not equity.

The common pool problem influences the fiscal behaviour of subnational governments in a decentralised state. The literature is replete with the issue of the negative impact of intergovernmental transfers on own revenue efforts of subnational governments. Theories predict that subnational governments will lower efforts in raising own revenues with the constant flow of intergovernmental transfers from the central government (Bradford & Oates, 1971a, 1971b). Poor own revenues characterise the Nigerian subnational governments. This situation has motivated the study on the impact of the unconditional transfers on own revenues of subnational governments in Nigeria. This study exploits the variation in own revenues of subnational governments using both static and dynamic panel data estimators, including instrumental variables

estimator to investigate the impact of transfers on own revenues. The results suggest that the Nigerian subnational governments indeed lower their efforts in own revenue mobilisation.

The governance architecture of decentralisation spurs the delivery of services (Oates, 1972, 1999; Faguet, 2008). This is explored in relation to improved access to sanitation and water services from a cross-country perspective. Given the gloomy reality of households' access to sanitation and water services in the 1990s, the United Nations (UN) declared improved access to sanitation and water in the year 2000 as part of Millennium Development Goals (MDGs) with the year 2015 as the deadline for universal coverage across the world. Though much has been achieved with respect to the improved access to sanitation and water services around the globe, many households still lack access to these basic services (WHO/UNICEF, 2015). This situation necessitates the inclusion of water and sanitation services among the Sustainable Development Goals (SDGs). Given that water provision, including sanitation service, is susceptible to environmental factors (Oates, 2002), a chapter in this essay explores the contribution of decentralisation to improved access to water and sanitation services around the globe. The study, exploiting the variation in the annual data on the improved access to sanitation and water services around the world using static panel data estimators, finds that decentralisation contributes positively to improved access to water and sanitation services.

Given the longitudinal nature of the data for this study, we employ the panel data econometric approach in the empirical analysis. These estimators exploit both the time and unit dimensions of data, thereby yielding more information than only time series analysis or cross-sectional data analysis on units of study. Specifically, these estimators help in controlling for omitted variable or unobserved variable bias as a unit can be observed for more than one period. Panel data estimators allow for both entity and time effects which can yield more information that is specific to a unit and/or change over time (Stock & Watson, 2012; Verbeek, 2017).

Overall, the findings from these essays constitute important contributions to the understanding of fiscal decentralisation, particularly concerning studies that focus on Nigeria. The Nigerian state presents peculiar fiscal federalism which has remained largely unexplored in the literature on fiscal decentralisation. In particular, the essays that explore the Nigerian fiscal decentralisation are the first major studies to examine the Nigerian fiscal decentralisation empirically with respect to politics inherent in intergovernmental transfers and the impact of transfers on own revenues of subnational governments. This study is an essential contribution to the literature towards the understanding of this nominal federal state. It also advances the understanding of fiscal decentralisation with the issues of improved access to water and sanitation services.

The study comprises three related articles apart from the general introduction and conclusion. All these are organised in five chapters. The three main essays which appear in Chapter Two to Four are closely linked. Though the articles are thoroughly discussed based on the peculiarity of literature with respect to each article, they all connect to the central theme of this study. Following the first chapter is the chapter on the politics inherent in the formula-based intergovernmental transfers with a focus on Nigeria. The essay in Chapter Two investigates the effectiveness of institutional mechanisms in arresting the problem of political considerations in intergovernmental transfers. Chapter Three presents the essay on the impact of intergovernmental transfers on own revenues of subnational governments in Nigeria. Chapter Four explores the effect of decentralised governance architecture on the improved access to sanitation and water services from a cross-country perspective. In Chapter Five, a general conclusion is presented for the study, including the limitations of the study, and some suggestions for future research.

Chapter II: Is There an "Invisible Hand" in the Formula-based Intergovernmental Transfers in Nigeria?

1. Introduction

Intergovernmental relations in a federal system of government[2] engender a cooperative system, which entails the sharing of responsibilities and resources, in governance. Normative theories of intergovernmental transfers of the Arrow-Musgrave-Samuelson[3] (AMS) tradition dictate that transfers should be determined on the bases of equity and efficiency for even provision of services and development across the subnational geopolitical space in a federation (Musgrave, 1999; Oates, 1972, 1999, 2005). However, empirical evidence suggests that intergovernmental transfers are laced with political considerations. Intergovernmental transfers are susceptible to becoming a political instrument in the hands of the central government in a federal system. This happens especially where it is discretionary and/or forms the bulk of revenues of subnational governments.

Nordhaus' (1975) and Lindbeck's (1976) treaties on the political business cycle in the Keynesian tradition pioneer the tactical manipulation of the economy for political gains. The theoretical contributions of Cox and McCubbins (1986) and Lindbeck and Weibull (1987) point out that tactical redistributive policies under a federal system are targeted at gaining favour with either core supporters or pivotal groups. The party at the centre deploys distributive politics to buy off support from core constituencies for electoral support to remain in power. This may be done under a federal finance arrangement through the tactical allocation of grants. Studies have turned up evidence of political instruments inherent in intergovernmental transfers (Porto & Sanguinetti, 2001; Kauder, Potrafke & Reischmann, 2016). Two institutional mechanisms have been designed as checks to stem this anomaly under fiscal federalism: the establishment of formulae for allocation of intergovernmental transfers, and the establishment and delegation of distribution of transfers to independent agencies (Khemani, 2007). Even so, manipulation of the grant-receiving governments for political gains by the grant-giving governments is evident under a federal system in many countries.

The extant practice in Nigeria conforms to the formula-based approach. However, this is not completely free of opportunism and targeting as the institutional body's executives are appointees of the president. In addition, the existence and acceptance of a formula are based on a political equilibrium that exists at a particular time which may give way to another formula in the face of a new political development. In realisation of the above and the lack of a detailed country-specific study on Nigeria, this study explores the compliance of the formula-based transfer system in Nigeria to equity consideration. Though Boex and

[2] Federalism, as used here, owes its meaning to the structure of the public sector (see Oates, 1972).
[3] See Oates (2005) for a detailed discussion of this view.

Martinez-Vazquez (2005) included Nigeria among the countries studied, their study did not capture some fundamentals of the political economy of intergovernmental transfers in Nigeria. The Nigerian environment presents an interesting case given the moral hazard and tax exporting issues occasioned by attempts to balance development across the subnational geopolitical space through intergovernmental transfers.

This study is a significant contribution to the growing literature on politics of distribution of intergovernmental transfers with a specific focus on Nigeria notwithstanding the formula-based revenue-sharing arrangement between the federal and subnational governments. As established in this study, studies have found that the formula-based system is not a deterrent to manipulation and political targeting in intergovernmental transfers, particularly in developing new democracies (Caldeira, 2012; Allers & Ishemoi, 2011; Banful, 2011; Khemani, 2007). The finding from this study is similar to results of Caldeira (2012) on Senegal, Allers and Ishemoi (2011) on Tanzania, and Banful (2011) on Ghana where the formula-based intergovernmental transfer mechanisms are in operation. Though these countries are decentralised, they are not federal states by the constitution like Nigeria. Furthermore, this study discusses the peculiarity of the Nigerian federalism that makes distributive politics inherent in intergovernmental transfers. Political developments and ethnic rivalry in Nigeria lay emphasis on equality, population, and landmass in revenue sharing at the horizontal level. These variables determine the bulk of transfers to states from the distributable revenues at any time despite differences in the rate of urbanisation and the need to fund developmental projects to cope with the urbanisation. The study is organised as follows: in section two, the theoretical and empirical literature is reviewed. In section three, the study focuses on intergovernmental transfers in Nigeria and its institutional foundation. Section four deals with the methodology. Presentation and analysis of results are dealt with in section five, including robustness checks. The study is concluded in section six.

2. Literature Review

In this section, two sets of literature are reviewed. The literature review focuses on the development of the theoretical literature on the political economy of intergovernmental transfers and the empirical application of these theories.

2.1 The theories of politico-economy of transfers

The normative theory of revenue allocation among tiers of government in a multi-level governance structure emphasises equity and efficiency in determining how much is granted to various levels of government vis-

à-vis their responsibilities. This view very importantly considers the welfare of the people at each jurisdiction of governments. However, economists, especially public choice specialists, have observed that politicians tactically use intergovernmental transfers in such a way that will create an opportunity for the government at the centre to maintain a hold on power. In relation to this view, models have been developed to explain how politicians exploit economic conditions and variables in ensuring electoral victory for their parties. Economic literature has recognised two strands of political redistribution in promoting the incumbent probability of re-election at the polls: the opportunistic political budget cycle model, and the tactical redistribution model.

The seminal contributions to the model of opportunistic political business cycle model were advanced by Nordhaus (1975) and Lindbeck (1976). This model describes the exploitation of inflation-unemployment nexus of the Phillips curve for political gains by politicians in order to remain in power through the manipulation of macroeconomic variables for specific exploitable outcomes.[4] The political objectives of the politicians are achieved through a crafty creation of unsustainable economic conditions that please voters just before an election. Based on the expectations-augmented Phillips curve, Nordhaus (1975) opines that the incumbent government manipulates economic policy variables to bring about unsustainably low unemployment in pre-election periods and high unemployment in post-election periods. This endears the politicians to voters who reward them with votes that will sustain them in office based on the visible performance before the election. This pattern continues at every election because voters lack the knowledge of this opportunistic behaviour. In effect, politicians are profit maximising agents crafting policies for votes, unlike entrepreneurs selling products for money (Downs, 1957). This usually occurs at every period of the election. And, it generates business cycles. Lindbeck (1976 p. 13-14) captures this behaviour with the explanation that "when the responsibility for macroeconomic stability is relegated to the politicians, it is unavoidable that the interpretations and the implementation of this responsibility become strongly colored by specific features of the political system, in particular by short-term vote-getting considerations..."

The emergence of rational expectation theory whittles down the potency of the Nordhaus-Lindbeck hypothesis in explaining the opportunistic behaviour in government. The idea that the incumbent government can stimulate the economy before the election for electoral gain became weakened. The rational expectation model is based on the information asymmetry between the incumbent officerholder and the electorate on the competence of the incumbent officeholder. This model assumes that the incumbent officeholder knows his level of competence more than the electorate. Thus, he can take advantage of the

[4] For a partisan version of this model, see Hibbs (1977). This explains the policy concern of parties in a two-party dominant democracy where the left-wing is concerned with unemployment while the right-wing cares about inflation. See Dubois (2016) and Veiga, Efthyvoulou & Morozumi (2019) for current developments.

electorate by signalling competence through the manipulation of macroeconomic variables in order to appear as competent when he is facing an election. As in the Nordhaus-Lindbeck model, this also generates a political business cycle, but short-lived due to the rationality of the voters. Cukierman and Meltzer (1986) note that where the public has insufficient information about the competence of the incumbent political officeholder, the public will base the government's future actions and their voting decisions on the level of welfare experience under the government. According to them, this problem of asymmetry and its social cost can be eliminated if information possessed by the electorate as well as the political officeholders is symmetric.

Rogoff and Sibert (1988) posit that the electoral cycle in macroeconomic policy variables is driven by information asymmetries between the government and the governed. This is made possible by the lag in the policy choice variables and the manifest impact of the policy variables. Rational incumbent exploits this by making the "competency shock" visible and large enough before an election. Rogoff (1990) shows that the incumbent officeholder has an incentive to bias public expenditures in favour of current consumption expenditures, especially visible expenditures but delays public investment. Shi and Svensson (2006) in their model submit that the electoral budget cycle is a function of political rents of the incumbent and the share of informed voters in any political space. The model of Alt and Lassen (2006) shows that lower transparency is associated with a large electoral cycle where an incumbent uses debt finance to gain electoral support. However, moving away from the information asymmetry on the competence of the political officeholder about the management of fiscal policy, Drazen and Eslava (2006) develop a model of less than perfect observability of fiscal policy. They reveal that politicians use expenditures on public goods to target strategic voters to their electoral victory, and voters who are aware of being targeted by politicians find it rational to vote for them.

The literature on tactical redistribution is spearheaded by Cox and McCubbins (1986), and Lindbeck and Weibull (1987). Cox and McCubbins (1986) view electoral politics as a redistributive game in which electoral candidates plan redistributive welfare programs among groups in their constituency for political gains. They contend that if groups can be ordered with regard to relevance to the electoral candidates' aspiration, they can as well be ordered as regards redistributive benefits. They show in their model that a risk-averse candidate will invest relatively more in their core supporter groups while a risk-loving candidate will invest more in swing voters. On the other hand, Lindbeck and Weibull (1987) view voters and the political office-seekers as two self-interested and maximising agents who interact in the political system. The aim of an office-seeker is to win an election while the objective of the electorate is to choose the best from available

policies represented by the office-seekers. Given the non-symmetric reaction to transfers and taxes, and that transfers can be targeted at a specific group, Linbeck-Weibull hypothesise that electoral candidates will target large transfers at swing voters.

Dixit and Londregan (1996) identify two kinds of redistributive programmes under interest group, pork-barrel politics: grand redistribution through taxes and the general social welfare system, and tactical redistribution through "pork barrel." While the grand redistributive programme is fixed and only change when there is a change of ideology, tactical redistribution is the continuous subject of everyday policymaking even when grand redistribution is in place to take care of the officeholder's core support groups or swing voters. In a model of majority voting with two competing parties, they show that if parties are efficient in targeting transfers at any group, the model explains the swing voter theory; but, if parties are only effective in delivering targeted transfers to their core support group, the model explains the core constituency theory. Still, on tactical redistribution, Dixit and Londregan (1998) offer an additional explanation. In this model, they explain that parties adjust their ideological positions to take care of both ideological and pork-barrel components of their public policies to attract the swing voter groups whose cutpoints change in response to redistribution promises targeted at them.[5]

2.2 Empirical studies on intergovernmental transfers

The theoretical models of politico-economy of intergovernmental transfers explained in the previous section have received the attention of scholars in the field of political economics with a view to understanding to what extent are intergovernmental transfers influenced by political considerations. According to Mueller (2002, p. 124), "a normative *raison d'être* for the state ... is that state exists to provide goods and services to its citizens that they cannot obtain in Pareto-optimal quantities without the state." But, the models of the political economy of intergovernmental transfers have pointed in another direction. These models have one thing in common that the central government's transfers in a federation are cyclical either in the form of "pork barrel" or manipulation of macroeconomic instruments to create a favourable economic environment around election time with the grand intention of influencing voters' choice.

A test of politico-economy models of intergovernmental transfers using the Swedish data by Dahlberg and Johansson (2002) find evidence of tactical distribution of government funds to subnational governments.

[5] This conforms with the Director's Law which explains the preference for the middle class in redistributive politics at the expense of both the rich and the poor. See also Benhabib and Przeworski (2006).

They conclude that there is strong evidence for the Lindbeck-Weibull/Dixit-Londregan model under which political parties target pork barrels at swing voters, but there is no evidence of transferring pork barrels to core support groups. Case (2001) concludes that porks are distributed based on the support received at previous elections in the case of Albania. The central government sometimes uses visible public investments to sway voters' preference in their favour. This is the case in a study by Costa-i-Fonta, Rodriguez-Oreggia, and Lunapla (2003) on Mexico. They submit that allocation of public investments by the incumbent party is influenced by political opportunism and local pork-barrel politics; the allocation of public investments to regions is determined by their support for the central government. Porto and Sanguinetti (2001) conclude in their study on Argentina that per capita representation in parliament rather than normative factors explained intergovernmental transfers despite the Argentine partial formula-based system. Another study tests the Lindbeck-Weibull and Dixit-Londregan models using the Swedish data, Johansson (2003) concludes that evidence exists in support of these models and that large grants are directed to swing voters in low-income regions.

Using regional monthly data, Akhmedov and Zhuravskaya (2004) find evidence of political targeting in federal finance in Russia; the political opportunism is a function of the age of democracy; and, pre-electoral manipulation is effective in ensuring the re-election of the incumbent. In accordance with theory, Ansolabehere and Snyder, Jr (2006) present strong evidence that the distribution of income is skewed in favour of regions which give the incumbent the strongest support at the election, while they argue that there is weak evidence that pivotal states are targeted. Veiga and Pinho's (2007) study on Portugal concludes that there is an influence of political consideration in intergovernmental transfers, but the importance of these political factors changes over time. The study does not find support for Cox and McCubbins' (1986) model but reports support for the Rogoff and Sibert's (1988).

It has also been established that grants are driven by political consideration with core support areas being targeted with pork (Veiga, 2012; Simón-Casano, Lago-Peñas, & Vaquero, 2014; Kauder, Potrafke, & Reischmann, 2016). Cukierman and Meltzer (1986), Rogoff and Sibert (1988), Rogoff (1990), Alt and Lassen (2006) and Shi and Svensson (2005) have pointed at the influence of information asymmetry on the electoral budget cycle in their models. Veiga, Veiga, and Morozumi (2017) show and establish that media freedom matter for an electoral budget cycle. They point out that low media freedom paves the way for the incumbent to manipulate his way into electoral victory. All the above studies have been conducted on either a developed country or a mix of developed and developing countries. This is so because many developing countries are just embracing decentralisation after years of colonial rule. Apart from this, weak

institutions have made centralisation preferable until recently. Lately, many developing countries have evolved a formula-based system of intergovernmental transfers under an institutional manager to eliminate political targeting and ward off its institutional weakening effects in intergovernmental transfers.[6]

A few studies have been conducted on African countries to examine the impact of these institutional mechanisms in limiting political opportunism in intergovernmental transfers. One of such is the study by Banful (2011). Using data on Ghana, he concludes that the formula-based intergovernmental transfer mechanisms do not eliminate politically motivated targeting in intergovernmental grants. In a study on Senegal, Caldeira (2012) find that transfers are not in conformity with the theoretical consideration of equity and that evidence of tactical political consideration abounds in intergovernmental transfers with swing communes being targeted. After Tanzania replaced discretionary transfers which favour regions with a large number of representations in the parliament with a formula-based system, a study was conducted to determine the effect of the change on intergovernmental transfers. Allers and Ishemoi (2011) conclude that formula-based allocation does not eliminate political targeting in Tanzania.

3. Intergovernmental transfers in Nigeria

3.1 Institutional foundation of the Nigerian intergovernmental transfers

The Nigerian state is constitutionally a multiparty federal democracy. The federal system of government entails multiple governmental jurisdictions under the same sovereign authority where powers and authorities are shared among various jurisdictions that make up the state. This comes in various forms.[7] The Nigerian federal system of government emerged from an amalgamation of different geopolitical entities under the colonial government. The federal system has been in place before Nigeria's independence in 1960, albeit with various modifications. At independence, Nigeria had a federal system of government consisting of the central (federal) government and three regions at the subnational level. However, since independence, the Nigerian geopolitical structures had undergone many changes until 1996 when the last significant changes to the second administrative level (state) of the federal structure were made. The Nigerian federal system of government embraces a three-level system of federalism: the central government, regional/state governments,[8] and local governments. The 1999 Constitution, which was adopted after the last modification to the federal structure, recognises the central government, 36 autonomous states, a semi-autonomous

[6] See Khemani (2007) for a detailed explanation.
[7] See Gómez-Reino & Martinez-Vazquez (2013) on fiscal decentralisation across the globe.
[8] The regional system was in place pre-and post-independence in Nigeria until 1967 when states replaced the regions. See Table II.A3 (p. 39).

Federal Capital Territory (FCT), Abuja and 774 local government areas (see Table II.A3 and Figure II.B1 for the distribution of the local governments per state).

Under the federal system, a cooperative system of government is forged. The cooperative system produces intergovernmental relations that engender an autonomous, interrelated, and interdependent structure of government. This is the case, particularly when the expenditure and tax assignment in a federal system of government are considered.[9] The structure of government including tax assignment is such that the central government is almost always amenable to making intergovernmental transfers to subnational governments. Transfers are made to help the less developed subnational units in meeting basic services provision. It is also made to alleviate the challenges confronting the subnational governments arising from a mismatch in revenues and constitutional responsibilities. Also, funding government through intergovernmental transfers help in building capacity at the local level, improve governance, and make the local people own their governments (Faguet, 2008).

The Nigerian Constitution specifies the functions as well as the revenue-generating powers and sources of revenues for the three levels of governments in Nigeria. These functions, powers, and revenue sources have also undergone many changes. They change according to political developments, particularly when there is a change in the constitution of the country. These functions which require the assignment of expenditure responsibilities are enshrined in the 1999 Constitution (see Table II.A4). The constitution also gives powers and authorities over specific sources of revenue (see Table II.A5). Statutorily, all revenues realised by the federal government, including its agencies after deduction of costs are paid into a "distributable pool account" otherwise known as the federation account. The federal government receives the largest chunk of revenues according to the extant vertical sharing formula of 52.68 percent, 26.72 percent and 20.60 percent for federal, state and local governments respectively (see Column 12, Table II.1). This formula has been in existence since the year 2004. There are other statutory allocations that must be made before the balance in the federation account is shared. These include the 13 percent derivation funds to be deducted from revenues realised from the sales of the produce of mineral resources that are economically profitable to be shared by states from which those resources are sourced.[10]

The huge revenue accruing to the federal government from revenue sources allocated to it necessitates the constitutional provision for intergovernmental transfers. Another economic reason for this is the need to

[9] The capacity for collection is usually a major factor in tax assignment. As such, the central government is saddled with the collection of certain taxes; thus, the central government raises more revenue than other levels of government. On the other hands, allocative functions are better performed at subnational levels (Oates, 1972, 1999; Musgrave, 1999). All these necessitate intergovernmental transfers among different tiers of government in a federal system.

[10] The term mineral producing states is used here because the derivation principle in no longer limited to oil resources; it now includes other minerals that are economically profitable.

help the poor states to develop. As there are transfers from the federal government to states and local governments, the constitution also recognises the need for states to transfer funds to support the operation of local governments. This arises out of the limited revenues that could be raised from assigned revenue sources to the third level of administration in Nigeria. But, intergovernmental transfers from states to local governments are infrequent and insufficient as compared with transfers by the federal government. Revenue sharing is a highly contentious issue in the Nigerian federalism.[11] This has necessitated the use of a formula-based system of revenue allocation, and the constitution of an institutional body to oversee this arrangement. Before and under the present institutional body, Revenue Mobilisation Allocation and Fiscal Commission (RMAFC), many vertical sharing formulae have been evolved to calm frayed nerves over squabbles on revenue allocation (see Table II.1).

Of course, the existence of a vertical allocation formula requires the same for horizontal revenue allocation, particularly in a multi-ethnic society like Nigeria, where there are mistrust and moral hazard on revenue issues. This arises out of the ways and manners the federal government has handled revenue allocation. This is reflected in the variables that make up the horizontal revenue allocation formula which has not changed since the return to civil rule in the year 1999. Equality, population, and landmass determine a large chunk of what is transferred to any state as revenues from the federal government according to the extant formula (Table II.2). This leads to less than optimal responsibilities sharing with concomitant ills that could threaten the federal arrangement such as tax exporting, moral hazard, and debt crisis.

Notwithstanding the revenue allocation through the formula-based system, there are sections of the constitution that spelt out support to subnational governments. Specifically, *Section 164* of the 1999 Constitution stipulates support to subnational governments in the form of grants in aids with no definite formula. Again, such support has always been given under the executive power with less interference from the national assembly as prescribed by the constitution. By and large, the allocation of a grant like this based on the whims and caprices of the government at the centre makes it amenable to political targeting. In addition, under *Chapter II* of the 1999 Constitution which is codenamed *Fundamental Objectives and Directives Principles of State Policy*, the federal government has a few justifications for targeting a particular section of the country through porks for political purposes. *Section 16* (2) (b) under *Chapter II* states "that the material resources of the nation are harnessed and distributed as best as possible to serve the common good." This section makes discretionary allocations possible for a government at the centre to provide pork

[11] Various commissions' reports and constitutions before and after independence document issues on the Nigerian fiscal federalism. The literature on fiscal federalism in Nigeria, such as Adamolekun (2005), and Phillips (1971, 1991), is replete with contentious issues of the Nigerian federalism. The focus here is to find out if there is an element of political targeting in federal finance in Nigeria, despite the formula-based revenue allocation system.

barrels in support of its political base or a pivotal jurisdiction which may be hard to be labelled as such by the opposition.

3.2 The federation account

The federation account as it is known today is a metamorphosis of what was recommended as "Distributable Pool Account" in the pre-independent Raisman Commission's Report of 1958. This was retained in the reports by subsequent revenue commissions under various appellations. The federation account is a warehouse for all revenues earned by the federal government that will ultimately be shared among multiple levels of government in Nigeria. This is constitutionally recognised. *Section 162* (1) of the 1999 Constitution states explicitly that "the Federation shall maintain a special account into which all revenues by the federal government shall be paid." However, certain revenues of the federal government are exempted from this provision such as the personal income tax (PIT) of the personnel of the armed forces, the police, the ministry of foreign affairs, and the residents of the FCT, Abuja.

The revenue in the federation account is shared by the Federal Account Allocation Committee (FAAC) whenever fund is to be shared among tiers of government. The fund is shared based on the extant formula, which is subject to review every five years from the day it comes into effect.[12] But the current formula has been in existence since 2004 through an executive order. In other words, this is not an act of parliament as stipulated in the 1999 Constitution, the current law governing the federation and government operations. This underscores the influence of politics over institutions in intergovernmental revenue allocation (Khemani, 2007). In addition, this may be an indication of the existence of political targeting. An attempt to please a certain section of the country that may be affected may have made the suspension of the review of the extant formula desirable. This may have defeated the purpose of instituting a formula-based system of revenue sharing. The purpose of the revenue sharing arrangement is to help the states that may not do well in the absence of financial support from the centre to support their operations. Also, this allows the subnational governments to focus on the business of governance as states lack the capacity to collect certain revenues. More importantly, it helps in the attenuation of differences in states' fiscal capacity. However, the purposes and objectives of the design and operation of federation account have been defeated by the focus of subnational governments on how to expand their share of funds in the federation account.

[12] Currently, the formula in column 12 Table II.1 (p. 16) is used for vertical allocation. Then, the variables displayed in Table II.2 (p. 17) are used to determine transfers to states and local government areas.

Table II.1: Vertical Revenue Allocation formulae in Nigeria, 1981-2004 (in percentage, %)

Recipient	1981	1984	1989[r]	1990	1991[r]	1992[b]	1992[c]	1999	2002[d]	2002[e]	2004
Federal government	55	55	47	50	47.5	50	48.5	48.5	56	54.68	52.68
Special Funds	4.5	2.5	8	5	10	5	7.5	7.5	7.5	6.185	4.18
1. FCT	-	-	1	1	1	1	1	1	1	1	1
2. Stabilisation	-	-	0.5	0.5	0.5	0.5	0.5	0.5	1.5	0.725	0.5
3. Derivation	2	-	2	1	1	1	1	1	-	-	-
4. Dev. of MP Areas	1.5	1.5	2	1.5	1.5	1.5	3	3	-	-	-
5. General Ecology	1	1	0.5	1	1	1	2	2	2	1.46[f]	1
6. Pry Education Fund	-	-	-	-	5	-	-	-	-	-	-
7. Dev. of NMP Areas	-	-	0.5	-	-	-	-	-	-	-	-
8. Savings	-	-	2	-	-	-	-	-	-	-	-
9. Dev. of Nat. Resources	-	-	-	-	-	-	-	-	3	3	1.68
State Governments	30.5	32.5[a]	30	30	28.5	24	24	24	24	24.72	26.72
Local Governments	10	10	15	15	14	20	20	20	20	20.60	20.60
Total	100	100	100	100	100	100	100	100	100	100[g]	100

Notes: [r] denotes vertical allocation formulae recommended by the RMAFC but these were not implemented.

[a] 2% of the mineral component of the entire 32.5% due to states from the federation account is to be shared based on the derivation principle.

[b,c,d,e] denote implemented allocation formulae by the federal government in January 1992, June 1992, May 2002, and July 2002.

[f] From July 2002, the special allocation becomes federal government share of derivation and ecology.

[g] The total due to the federal government was approximated to 54.68%.

Also, since May 2002, all the special allocations are part of the federal government's share, and the formulae are based on executive orders.

MP and NMP imply mineral producing areas and non-mineral producing areas, respectively.

Source: Inyang, E. O. (2013, p. 8), and author's compilation from official government documents.

Table II.2: Horizontal Revenue Sharing Formula, 1999-2016 (%)

The basis of Sharing			Percentage of Total Fund
Equality:			**40**
Population:			**30**
Landmass and Terrain:			**10**
Landmass		5	
Terrain		5	
Social Development Factors:			**10**
Education			
Primary school enrolment	2.4		
Secondary/Commercial school enrolment	0.8		
Inverse secondary/commercial school enrolment	0.8	4	
Health			
Hospital beds	1.5		
Hospital beds inverse proportion	1.5	3	
Water			
Water supply spread	1.5		
Rainfall inverse proportion	1.5	3	
Internal Revenue Effort:			**10**
Total			**100**

Notes: The variables in the table determine transfers allocation at a horizontal level in Nigeria. The formula has remained the same since the advent of the fourth republic in 1999. What each state of the federation gets is determined by the parameters defined in the table. This formula is applied to vertical allocation to all states to determine what each state will get (see column 12 of Table II.1 for state governments' share of vertical allocation). Bird and Smart (2002) caution against the use of a measure of fiscal effort in allocation formula (See the article for a detailed discussion). Until 2010, revenue efforts of state governments were not published in Nigeria. Currently, there is no publicly available data on internal revenues of the 774 local government areas. Yet, they receive transfers just like state governments from the federal government. Hence, it is difficult to say the own revenue effort is applied in revenue sharing in Nigeria. Source: Author's compilation.

3.3 The revenue mobilisation, allocation and fiscal commission (RMAFC)

In order to arrest the problem of political targeting in revenue allocations in many developing nations, some of these countries have delegated intergovernmental revenue allocations to institutional bodies with legally guaranteed formulae (Khemani, 2007). Until 1988, various commissions and committees had advised the Nigerian government on revenue allocation.[13] In 1988, RMAFC was established as a permanent body to advise the federal government based on the prevailing situation on revenue allocation. The formalisation of the establishment of the commission through an act was made in December 1989. The Nigerian 1999 Constitution also recognises this body. *Section 153* (1) enlists the commission among the establishments of the federal government. The composition and powers of the commission are stipulated in the *Third Schedule, Part I, Section 32* of the 1999 Constitution. This body comprises of a chairman, and other members representing each state of the federation and the semi-autonomous FCT, Abuja. They are all appointees of the president subject to the approval of the Senate.[14] The Senate's approval is just a formalisation of the constitutional provision, especially when one considers the fact that the party controlling the executive arm of the government usually controls the majority in the legislative arm in Nigeria.

Among other things, the commission is to track accruals into and outlays of revenues from the federation account. The commission is also charged with the review of existing revenue allocation formula and principles in line with economic developments subject to a provision that the extant revenue allocation formula has remained in operation for at least five years. The body also has to advise governments at all levels in the federation on fiscal efficiency and how to improve their revenues. All these functions are to be performed without political interference as an independent body. But this is a body that is founded on politics, and all appointees though may be professionals cannot but be loyal to the government that appoints them. For this reason, the work of this body may be affected by interest groups in government. The body has had its recommendations rejected based on political grounds rather than economic criteria. The recommended vertical allocation formulae for 1989 and 1991 by RMAFC were not adopted.[15] This underscores the subsidiarity of the power of the institution to political forces. In view of the judgement of April 5, 2002, by the Supreme Court of Nigeria (SCN) which nullified the extant vertical revenue allocation formula at the time, an allocation formula recommended by RMAFC should have been forwarded to the national assembly for adoption in line with *Section 162* (2) of the 1999 Constitution. The Supreme Court's judgement altered the vertical revenue allocation formula in operation in conformity with the 1999

[13] See footnote 12.
[14] Between 2007 and 2016, the commission has had two substantive chairmen and two acting chairmen. It should be noted, however, that an interim chairman does not have full executive power.
[15] See columns 4 and 6 of Table II.1 (p. 16).

Constitution of the country as against the practice since the beginning of the fourth republic[16] in the year 1999 under the Nigerian 1999 Constitution.[17]

The nullification resulted in the issuance of an executive order based on the discretion of the executive in power in lieu of the constitutional provisions. This led to the emergence of three different vertical allocation formulae within two years; two in the year 2002, and the last one in the year 2004 which is still in operation (see Table II.1 p. 16). The politics behind these executive orders have led to the violation of the 1999 Constitution on the review of the revenue allocation formula.[18] The bickering between the federal and the state governments on the one hand, and among the state governments, on the other hand over the vertical and horizontal allocation formulae respectively has almost rendered the RMAFC impotent. What has always resulted in the crisis between the central government and subnational governments is the way the federal government manages the common pool. In particular, the special funds[19] in the vertical allocation formula have always been managed by the federal government until 2002. The subnational government always suspect the central government in its ways and manners of managing these funds. The crisis from the bickering does not augur well for the federation as many formulae that have been evolved over the years have been based on political reasons. The result is that some states continue to depend on allocation from the centre, which makes them amenable to the federal government's control, rather than working to generate revenues based on their economic potentials.

3.4 Electoral system and election in Nigeria

Nigeria runs a multiparty presidential system of government.[20] The election into the office of the president is based on qualified simple majority votes. This system requires that in addition to obtaining the majority votes at the general election, the elected president must win 25 percent of votes in two-thirds of states of the federation and the FCT. The president is electable for a maximum period of two four-year terms of eight years. The bicameral legislature is in operation in Nigeria at the national level with 109 Senatorial districts, and 360 House of Representatives' districts while a unicameral legislature is in operation at the subnational levels. The rule of the qualified simple majority also applies to the two other levels of government in Nigeria.

[16] The fourth republic commenced on May 29, 1999.
[17] The judgement given by the Supreme Court frowned at certain practices of the Federal Government with respect to the funds in the federation account, and the non-implementation of the 13 percent derivation principle as stated in the 1999 Constitution on revenues from natural resources.
[18] See Third Schedule, Part I subsection 32 (b), the 1999 Constitution of the Federal Republic of Nigeria.
[19] See Table II.1 (p. 16) for various allocations to special funds under various vertical formulae.
[20] At independence, Nigeria ran a parliamentary system of government until the army took over in 1966. The presidential system of the American type was introduced at the beginning of the second republic in 1979. Its operation continues in the fourth republic which began in 1999 under the 1999 Federal Constitution.

In other words, governors and chairmen of local government areas are also elected based on this electoral rule. By rule, all elective executive offices have a maximum electable period of two terms after which a person cannot seek re-election into the same office.

But, elections of the third administrative level executives, chairmen of local government areas are under various laws of states of the federation. While the Independent National Electoral Commission (INEC) conducts elections to the office of the president, governors of states, and both the national and state legislators including local governments areas in FCT, states' electoral commissions conduct elections into the offices of chairmen of local governments and councillors (legislators at local government areas). Thus, the laws of each state govern the election of chairmen and councillors. The legislators have no term limit at any level of government in Nigeria. The nature of party politics in Nigeria where there is a clear lack of parties' ideologies always ensures that the party that controls the executive arm of government has the majority in the legislature.[21]

Elections into the office of the president and the national parliament are held on the same day, while the election of governors of states and the state legislators are held on the same day. These elections are usually held within a period of one month. For periods cover in this study, general elections were held in April in 2007 and 2011 for both national and subnational elective offices under the management of INEC; but in 2015, presidential and the national assembly members' elections were held in March while governorship and state assembly elections were held in April. Over these periods, no less than 50 political parties were registered to participate in the general elections, but not more than 20 political parties participated in the presidential elections. Some political parties after receiving their certificates from the electoral umpire, INEC only exist to trade support/endorsement with active political parties.[22] However, there are states where elections into the offices of governors are not held during the general election. These states are Anambra, Bayelsa, Edo, Ekiti, Kogi, Ondo, and Osun. This arises out of the Supreme Court's judgements on electoral disputes concerning the elections into the offices of governors in those states, which have permanently altered the periods for governorship elections in the states.[23] Notwithstanding, the election of state assembly members of the states still follows the general election's date.

[21] This happens because carpet-crossing is not illegal, and the desire of the executive in power to always have their bills passed by the legislators creates the need for wooing legislators from the opposition into their parties.

[22] This situation arises because political parties in Nigeria appeal to their regional groups for support to win an election. All the presidential candidates that won elections over the periods covered in this study had massive regional support and won substantial votes at the polls in their regional base. In 2007, PDP won the presidential election, ANPP and AC came second and third respectively. Again, PDP won the presidential election in 2011, while CPC and ACN came second and third respectively. After the merger of ACN, ANPP, and CPC to form APC, the new party, APC won the presidential election in 2015 after a fierce contest between APC and PDP. Usually, the party that wins the presidential election controls the majority in both houses of the federal parliament and among the governors of states because of the two-thirds majority electoral rule (see the list of abbreviations for full names of political parties, p. xi–xii).

[23] There are states where elections have been held outside the general election's dates like Kebbi and Sokoto States. These are also products of the Supreme Court's judgements on electoral disputes. However, the judgements did not cause a move of the election of governors of the states outside the general election's

4. Methodology

4.1 The basic empirical model

The formula-based intergovernmental transfer system has been proposed as a mechanism to check inherent political interests in intergovernmental transfers. The formula-based transfer mechanism is expected to bring about equity in intergovernmental transfers. Therefore, this study is embarked upon to investigate if the formula-based intergovernmental transfer system in Nigeria conforms to equity criterion. Besides, are there political factors influencing intergovernmental transfers in Nigeria? In answering our research questions concerning intergovernmental transfer in Nigeria, the empirical framework of Boex and Martinez-Vazquez (2005) is adopted.[24] Boex and Martinez-Vazquez (2005) focus primarily on a set of decentralised countries, including Nigeria. But the study did not capture the fundamentals of the Nigerian fiscal federalism. Though our study employs their empirical framework, they differ with respect to their focus. Besides, this study explores the peculiarities of the Nigerian federalism with respect to the practice of the formula-based intergovernmental transfers.

Equation (1) relates the annual per capita intergovernmental transfers to a subnational government as a dependent variable to vectors of normative, political and other variables. The independent variables help to identify the motive behind the intergovernmental transfers (Figure II.B2) to a subnational unit according to the public choice theory of intergovernmental transfer. In accordance with the public choice theory, politicians care about public offices (Rogoff & Sibert, 1988). They will choose policies and redistributive programs in a manner that will ensure their re-election into public offices by either targeting their core supporters or swing voters (Cox & McCubbins, 1986; Lindbeck & Weibull, 1987). The dependent variable, *Transfer*, is defined in real per capita local currency (*naira*). This helps in controlling for the differences in the sizes of subnational units both in geographical and economic sizes and avoiding the problem of heteroskedasticity.

$$Transfer_{it} = \beta\, Normative_{it} + \varphi\, Political_{it} + \gamma\, Other_{it} + \alpha + \xi_{it} \qquad (1)$$

date. A change in the regular election date is not mandated when the person that is being challenged is returned as elected governor whenever a rerun takes place. It will be deemed that the returned officeholder's term of office started the day he was first sworn into the office.

[24] A similar model has been used in studies by Veiga and Pinho (2007) and Caldeira (2012).

where i indexes a state and t represents a year. *Transfer* represents the fund allocated by the federal government to a state government per capita, *Normative* represents a vector of variables proxying fiscal needs (*Own revenue* , *Population density*, *Children population*, and *Educationally developed state*), *Political* is a vector of variables on political factors (*Opposition*, *Election year*, *Representative*, and *Term limit*) while *Other* represents a vector of politics of resource control and macroeconomic environment (*Oil producing state* and *Agricultural loan*). $\beta, \varphi, and\ \gamma$ are vectors of parameters to be estimated; ξ_{it} is the error term while α is the homogenous intercept term for each state i when the model is estimated using pooled ordinary least squares (OLS).[25] A modified version of the equation (1) following the work of Veiga and Pinho (2007) is stated as follows:

$$Transfer_{it} = \rho Transfer_{it-1} + \beta Normative_{it} + \varphi Political_{it} + \gamma Other_{it} + \alpha_i + \xi_{it} \quad (2)$$

$$i = 1, \ldots\ldots, N, \qquad t = 1, \ldots\ldots, T$$

where i and t are as described under equation (1). The parameters of interest to be estimated in equation (2) are ρ, β, φ, and γ. α_i is the individual effect of state i, while $\xi_{it}$is the error term. Equation (2) is important for our study. Beside endogeneity, transfers may be persistence over the years as political and normative factors, including other drivers may impact the transfers (Veiga & Pinho, 2007).

In public finance theory, AMS perspective of normative factors determines intergovernmental transfers to any level of government for the objective of welfare maximisation. The normative variables considered are *Own revenue*, *Population density*, *Children population*, and *Educationally developed state*. *Own revenue* represents each state fiscal capacity and an indirect measure of fiscal need (Figure II.B3). The variable is measured in real per capita local currency (*naira*). A state with a low internal income will require a large intergovernmental transfer, otherwise for a richer state. The a *priori* expectation for the sign of the coefficient associated with this variable is not definite. *Population density* is measured as the number of people in a state per square kilometre. States with high population density may have economies of scale in public goods production when compared with states with low population density; but, the pressure on these public goods due to usage may mar the economies of scale advantage. It is a pointer to the fiscal needs of a state. The

[25] Though this is not the only estimator that we use in our study, our estimation begins with OLS.

expected sign of the estimate of the coefficient associated with this variable is not clear. A sparsely populated state per square kilometre could receive less transfer because it is less politically relevant while a densely populated state could attract more transfer because of its politically relevant population.[26] Nigeria is a densely populated country with many young people. The number of the young population under the age of fifteen in each state is represented by the variable *Children population*. The need to provide for the young population by building schools, vocational centres, and recreational facilities may require large transfers to subnational governments (Veiga & Pinho, 2007; Mourão, 2012). This is to keep the population engaged and avoid a high rate of crimes. The expected sign of the coefficient associated with this variable is positive.

In Nigeria, there are states that are categorised as Educationally Less Developed States (*ELDS*). The states that are regarded as *ELDS* are 23 out of the 36 autonomous states.[27] The states have a higher number of out of school children, and they are less represented in universities across the country. They are thus categorised to encourage human capital development in those states through an increase in their representation at all levels of education. This is done by lowering requirements for citizens from the states. A state populated by less educated people will also likely have people with poor health as education is a major determinant of health. In addition, less educated people are likely to be poor as they are not able to make use of opportunities in labour markets. This categorisation represents a fiscal need for *ELDS*. States that do not belong to the *ELDS* are regarded as *Educationally developed states (EDS)*. A binary dummy variable is created to capture the effect of the educational status on transfers, 1 if a state is in the group of *EDS*, and otherwise for *ELDS* to represent their fiscal need. It is expected that *EDS* should get lower federal transfers. Therefore, the expected sign of the estimated coefficient of *EDS* is negative.

In order to test if political consideration matter for intergovernmental allocation to subnational governments in Nigeria, a vector of political variables is included in the model. The political variables are *Representative, Opposition, Election year*, and *Term limit*. *Representative* represents the number of representatives from each state of the federation at the lower house of the national assembly (Figure II.B4). Allocation in the federal budget is primarily the function of the national assembly which comprises the Senate and the House of Representatives. While the Senate is based on equal representation of states, representation at the House of Representatives is based on states' population and landmass. Political porks are allocated at the national assembly. This variable captures the influence of representatives in federal finance (Porto & Sanguinetti,

[26] The idea expressed here is a view on the effect of the population by Grossman (1994 p. 298) on the intergovernmental grant in Australia. Banful (2011 p. 385) argues if it is positive, it means normative factor influences transfer to states. If it is negative, it implies more development resources are being transferred to poorer states and a possible pointer to the tactical distribution of intergovernmental transfers.

[27] These states are Adamawa, Bauchi, Bayelsa, Benue, Borno, Cross Rivers, Ebonyi, Gombe, Jigawa, Kaduna, Kano, Kastina, Kebbi, Kogi, Kwara, Nassarawa, Niger, Plateau, Rivers, Sokoto, Taraba, Yobe, and Zamfara.

2001). The *a priori* expectation of the sign of the coefficient associated with the variable is positive. *Opposition* represents a dummy variable that takes 1 if the ruling party in a state is different from the ruling party at the federal level. This means that different parties control the government's apparatuses at two different levels of government. This dummy variable enables the test of the patronage politics of the core supporters' hypothesis (Dixit & Londregan, 1996; Veiga & Pinho, 2007; Veiga, 2012). The opposition party states may be denied some resources for not being in the party that controls the federal government. Indeed, there are states where political competition is fierce that the political party in power at the federal level will always want under its control.[28] The expected sign of the associated coefficient with this variable is negative.

Election year is a dummy variable that captures the effect of the opportunistic cycle in the allocation of funds to subnational governments (Veiga & Pinho, 2007; Veiga, 2012). This variable takes 1 for the general election year, and the election year for states that have their election of governors outside the general election period. Political parties compete for the control of states that have their gubernatorial elections outside the general election periods for political gains.[29] The *a priori* expectation of the sign of the coefficient associated with the variable is positive. *Term limit* is another categorical variable in the model. This helps to capture the impact of the gubernatorial term limit of a maximum of two terms (eight years) on the transfers to subnational governments in Nigeria. Given that transfers are laced with some form of control, we expect *a priori* that this will have a negative implication on transfers to subnational governments in Nigeria considering the multiparty politics of the environment.[30]

In examining the impact of other considerations in intergovernmental transfers in Nigeria, other variables to control for the resource control and macroeconomic environment are introduced into the model. These variables are *Oil producing state*and *Agricultural loan*. *Oil producing state (OPS)* is a dummy variable that takes 1 for the geese that lay the golden eggs in Nigeria.[31] Nigeria is an oil-producing country. The oil resources are located in some states of the federation. These states have a right to 13 percent of the money realised from the sales of crude oil before the remaining to which the oil-producing states are also entitled is shared. They are politically relevant because the money from the oil resources oils the wheel of administration and development in Nigeria. In addition, this 13 percent derivation allocation is a product of

[28] The direction of votes in Lagos, Kaduna, Kano, and the Rivers States determines the party that will win in any presidential election in Nigeria.
[29] The contest for the control of Ekiti State in the 2014 gubernatorial election between the party in power at the centre and the incumbent regional party in the state points to this. The party in power at the centre muscled its influence around its candidate in order to gain an inroad into the regional bloc of South-West.
[30] Under President Olusegun Obasanjo, Lagos State, under an opposition party, was denied allocations for many months for various political reasons. Towards the end of 2016, part of the Paris Club refund to Ondo State was not released because the outgoing opposition party was expected to be succeeded by a member of the party ruling at the centre. Veiga & Veiga (2019) find that term-limited mayors face both dwindling revenues and expenditures.
[31] The states collecting 13 percent derivation from oil revenues are Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo, Rivers; and the newly added state to the list is Lagos. The approval for the recognition of Lagos as an oil-producing state was given in August 2016, and its first share of 13 percent derivation fund was given in December 2016. Hence, in this study, we do not categorise Lagos as an oil-producing state.

a series of political agitations, threats (Treisman, 1996), and lobbies. This helps to confirm if they enjoy any special treatment apart from the 13 percent derivation allocation in intergovernmental transfers. The expected sign of the estimate of the coefficient associated with this variable is positive. The variable *Agricultural loan* is included to examine the influence of the states' economies on the transfers to subnational jurisdictions. Since the economy of most of the states depends on primary production, it is proper to use the value of loans granted to farmers in each state per capita under the Agricultural Credit Guarantee Scheme Fund (ACGSF) as a proxy for the size of state's economy. This is a program under the management of the Central Bank of Nigeria (CBN) to encourage and support lending to the agricultural sector through risk-sharing with commercial banks. The expected sign of the estimated coefficient associated with this variable is not definite.

4.2 Data, econometric issues, and estimation strategy

The data for the units of study is panel data, with cross-section and time dimensions. The data covers the year 2007 to the year 2016. Here, the data on *Transfer* represents the net allocation to states. The net allocation is what states get after their indebtedness that the federal government guaranteed, including the amount due in a joint project with the federal government has been deducted from the gross allocation. The gross allocation is the sum of allocations due to a state in a year (see Figure II.B2), but what they get is the net allocation. For both net and gross allocations, the 13 percent allocation is deducted from transfers to states that are entitled to it. This is done to eliminate biasedness as this can confound the relationship between *Own revenue* and *Transfer*. Other data includes dummy variables based on specific characteristics of the country that have been institutionalised.[32] The transfers in this study are in *naira*. Other monetary variables are also in the local currency; and, all monetary variables are adjusted for change in the time value of money using the composite consumer price index (CCPI) to obtain real variables. The transfer data is a monthly data in its original form because intergovernmental transfers are made monthly from the federal government previous month's income. On the other hand, the own revenue data is released quarterly. Some states do not make their own revenues data available quarterly but only at the end of the year. Thus, the data is aggregated for both transfers and own revenues over the year. All other data, including the constructed dichotomous variables, is yearly.

[32] The ELDS states are based on the classification by the Joint Admission and Matriculation Board (JAMB)

Correlation analysis of the variables obtained from the correlation matrix reveals that *Representative* and *Children population* on the one hand, and *Own revenue* and *Population density* on the other are positive and highly correlated. All other variables have correlation coefficients equal to or less than 0.5. Also, a test for the presence of serial autocorrelation in the data using the Wooldridge test for autocorrelation in panel data (Drucker, 2003; Wooldridge, 2010) confirms the presence of autocorrelation by the rejection of the null hypothesis of no serial autocorrelation with an F statistic of 77.29 at 1 percent level of significance. In addition, two tests are conducted to determine the presence of heteroskedasticity in the data. The Breusch-Pagan test for heteroskedasticity (Breusch & Pegan, 1979) with a null hypothesis that the error variances are all equal indicates that the null of homoskedasticity should be rejected with a Chi-squared statistic of 194.54 at 1 percent level of significance. The Breusch-Pagan test has the shortcomings of not detecting heteroskedasticity when the errors are not normally distributed, and when the variances are not linear. Notwithstanding the result of the Breusch-Pagan test, White's test (White, 1980) for heteroskedasticity, which is robust to other forms of heteroskedasticity is employed to check the data further. The null of homoskedasticity from the test result is rejected with a Chi-squared statistic of 85.08 at 1 percent level of significance. Both autocorrelation and heteroskedasticity have implications for the standard errors and efficiency of our estimates (Wooldridge, 2013). The regressions are clustered over the states to address the problems. The clustered robust standard error relaxes the assumption of no correlation in the errors by allowing correlation within clusters but not between clusters.

The full summary statistics of the data are displayed in Table II.3 below with additional information on the first year in the series, 2007 and the last year, 2016 in Tables II.A1 and II.A2 respectively in Appendix A. The descriptive statistics of the data for the regressions display the overall, between as well as within variability of the data. Though the overall variability of the data varies widely, what is evident is that the data varies widely between in comparative term with within variance of the data. Overall refers to the statistics computed for all states in the dataset; in computing the overall statistics, observations, N (357) are used. Between statistics explain the statistics computed for different states in the dataset. Information about n (36) is used in the computation of between statistics which compare state to state. Within statistics are computed for each state in the dataset. It gives information about variation within a state only. The within information may be negative because it is a deviation from each state's average. This is noticeable from the minimum observation for some variable in the model. The within minimum statistics for *Transfer*, *Own revenue* and others are negative. For the time-invariant variables, the standard deviation is 0, as shown in Table II.3 for *Representative*. All these have implications for the consistency and efficiency of the estimates and the estimation strategies that can be exploited in this study. In other words, methods that exploit more

of within variance cannot be fully implemented for all the data (Verbeek, 2017). The following estimation strategies: pooled ordinary least squares (OLS) estimator, fixed effects (FE) estimator, random effects (RE) estimator, and system generalised method of moments (SGMM) estimator are exploited in this study.

Table II.3: Descriptive statistics, 2007-2016

Variable		Mean	Std. Dev.	Min.	Max.
Transfer	Overall	9,661.95	5,525.95	647.67	57,234.86
	Between		3,384.75	5,057.55	22,540.21
	within		4,400.77	-9,021.94	44,356.60
Own revenue	Overall	2,000.58	2,803.20	120.27	19,492.75
	Between		2,730.53	391.74	15,599.69
	Within		741.09	-1,177.65	6,870.13
Population density	Overall	355.30	489.56	40.77	3,311.18
	Between		492.72	46.62	2,879.24
	Within		54.57	-41.34	787.25
Children population	Overall	1,866.99	840.00	712.87	5,291.55
	Between		829.80	815.06	4,581.83
	Within		185.19	1,216.01	2,576.71
Agricultural loan	Overall	46.74	43.78	0.00	276.41
	Between		27.41	14.10	112.27
	Within		34.38	-49.44	249.54
Representatives	Overall	9.94	4.32	5.00	24.00
	Between		4.37	5.00	24.00
	Within		0.00	9.94	9.94
Opposition	Overall	0.34		0	1
	Between			0	1
	Within			-0.46	1.24
Election year	Overall	0.34		0	1
	Between			0.30	0.50
	Within			-0.16	1.04
Term limit	Overall	0.14		0	1
	Between			0.00	0.20
	Within			-0.06	1.04
Educationally developed state	Overall	0.36		0	1
	Between			0	1
	Within			0.36	0.36
Oil producing state	Overall	0.25		0	1
	Between			0	1
	Within			0.25	0.25

Notes: The data is sourced from CBN, Joint Tax Board (JTB), National Bureau of Statistics (NBS), and Office of the Accountant General of the Federation (OAGF). The number of observations is 357, the number of states is 36, and T = 10. *Transfer*, *Own revenue* and *Agricultural loan* are in per capita term. Children population is in '000. All dummy variables are constructed by the author. Source: Author's computation.

4.2.1 Pooled OLS, FE, and RE

The pooled OLS exploits both within and between effects. Under this estimation strategy, the intercept and the slope coefficients are the same for all states. The essential requirement of this estimation technique is that the independent variables and the error term are contemporaneously uncorrelated. Thus, the estimate of coefficients by OLS is consistent and unbiased if the condition of no correlation between the error term and regressors is fulfilled. However, the structure of the error term in the OLS model always presents the problem of autocorrelation with considerable implications for the standard errors and efficiency of the estimates. In this study, the transfers to a state will be affected by unobservable features that are not susceptible to change over time. Therefore, it cannot be assumed that the error terms from different periods are not correlated. This requires that correction is made for autocorrelation in OLS, which is done by clustering the standard error at the state level for efficient and consistent estimates.

The FE estimator exploits within variance of an individual state and explains the changes observed in the individual state from time to time rather than between states. Unlike the OLS estimator, the FE exploits individual state-specific effect, which captures both observable and unobservable time-invariant differences across states (Verbeek, 2017). In the FE estimator, the expected value of the deviation from the mean of the regressors and the error term is zero; and, it is assumed that the error term, *epsilon_it* and the regressors are independent. This exogeneity condition requires that the current, future and past values of the regressors do not depend on the error term. This is required to have an unbiased estimate of the individual effect. For consistency, it is required that the time (*T*) goes to infinity because the individual average does not converge to anything under a short time (*T*). The time (*T*) is required to be large to avoid the underestimation of the true variance. But these conditions are not guaranteed in the face of the data for this study. More so, results from FE emphasise features of units included in the estimation for which the inferences are valid.

The RE estimator combines information from both within and between variances of the data in a more efficient way than OLS and FE. The RE assumes that the composite (individual component and the remainder component) error term is not correlated with regressors. Also, the remainder component is assumed not correlated while the serial correlation of the error term is associated with the individual component. Fulfilment of these conditions ensures that OLS estimates of the coefficients are unbiased and consistent. The structure of the error components implies that the composite error term inherently manifests a particular form of autocorrelation (Verbeek, 2017). The implication of this is that the standard errors of OLS estimator are wrong. A more efficient estimate of the standard errors can be obtained from the (feasible) generalised least squares (GLS) estimator by exploiting the structure of the variance-covariance matrix of

the error term. However, this requires that the regressors are not correlated with the individual error as well as the random error component, which is most times unrealistic. This study explores this estimator for the static panel analysis of this study. Given that the focus is on the subnational jurisdictions of a country, the likelihood that the economies will have similar characteristics is high. Thus, the study is only interested in any random state and not a specific state for the generalisation of our result.

With the aid of the Breusch-Pagan Lagrangian Multiplier test for random effects (Breusch & Pegan, 1980), a choice can be made between OLS and RE. The null hypothesis of this test is that there is no panel effect; in other words, variance across the units is zero, which implies OLS is efficient. However, this is almost always rejected in favour of RE in a panel data regression. Choosing between the RE and FE estimators may be difficult, especially with respect to the time dimension of the data. The difference between the two estimators in estimating data with small T is large. Again, while FE emphasises the individual state-specific effect in the sample, RE estimator focuses on a random individual state in the sample, which makes it possible to generalise finding on the population characteristics. But, RE requires that both the individual specific effect and the remainder component are not correlated with regressors, which is not required in FE. The Hausman test (Hausman, 1978) can be used to select between the two estimators, and it is distributed as Chi-squared. The null hypothesis of this test is that the individual component of the error term is not correlated with the regressors. In this case, FE will be efficient under both the null and alternative hypotheses while RE will only be efficient under the null hypothesis. A large difference between the two estimators suggests that the RE estimator is not consistent. A significant challenge in the practical application of this test is that the covariance matrix may not be positive definite, thereby invalidating the test. Overall, the goodness-of-fit, the R-squared from the three estimators are incomparable, because of the differing strength of the estimators in using within and between variances of the data efficiently.

4.2.2 Endogeneity and SGMM

Using any of the static panel data estimators in estimating coefficients of equation (2) presents issues of biasedness and inconsistency of the estimates. In this case, the study is confronted with endogeneity arising from the possible correlation between the lagged dependent variable and the residual error term. This can lead to spurious estimates. Thus, any static panel data estimator is inconsistent in estimating the betas of equation (2). Besides, economic behaviour tends to be persistent over time. The likelihood that transfers in one period may be dependent on past transfers, and the inclusion of own revenues of states which in principle are factored into transfers to states among the independent variables may make the dynamic

panel data model more suitable to address the issue under study. In view of endogeneity, reverse causality, and persistence issues including the fact that static panel models are inconsistent in estimating a model with a lagged dependent variable among the regressors, equation (2) is estimated using a dynamic panel model. The generalised method of moments (GMM) estimator allows heteroskedasticity error. The GMM neither requires information on the initial conditions nor the distribution of the composite error (Baltagi, 2013). GMM rests on instrumental variables with its efficiency being determined by a weighting matrix. The weighting matrix changes in relation to the presence of heteroskedasticity. A two-step GMM estimator is efficient in the presence of conditional heteroskedasticity (Windmeijer, 2005). The GMM is used in estimating equation (2), a system developed by Arellano and Bond (1991) and extended by Arrelano and Bover (2005) and Blundell and Bond (1998). Blundell and Bond (1998) show the limitation of difference-GMM and advance the SGMM, which exploits the imposition of restrictions on the initial conditions to produce an efficient estimator. The efficiency of this estimator rests on the absence of autocorrelation, at least autocorrelation of order 2 (AR2), because autocorrelation of order 1 (AR1) is expected due to the correlation of lagged dependent variable with the individual state-specific error. In all estimation, the independent variables are used as GMM instruments[33] with laglimits (2 3) while the year and regional dummies are used as IV-style instruments. The study follows the suggestions of Roodman (2009a, 2009b) in handling the estimation strategy to address the problem of too many instruments. In both equations, dummies for the mandate effects are included. There are three general elections in the periods under study; a dummy is created for each mandate.

5. Results

5.1 Empirical results

In this section, the results of the econometric estimation are presented. The results are displayed in Tables II.4 and II.5 below. Because of the number of time-invariant variables among the variables, the analysis of the results focuses on the results from the RE and SGMM estimators. RE is chosen because the results from RE can be generalised for the population under study. At the same time, the GMM makes it possible to circumvent the potential problem of endogeneity among the variables. The aforesaid is taken into consideration in the following analyses. Considering the results in columns 1 to 3 of Table II.4, *Own revenue* is positively correlated with *Transfer* under OLS but not statistically significant under both RE and FE.

[33] The GMM instruments are lagged by 1.

Opposition parties are penalised as results under OLS, RE, and FE indicate. *Election year* is consistently positive and statistically significant under all the three estimators. *Term limit* is negative and statistically significant under FE only while *Children population* is statistically significant and negative under OLS and RE.

Table II.4: A test of politics inherent in intergovernmental transfers in Nigeria using net transfers

Variable	OLS	RE	FE	OLS	RE
Own revenue	0.6215**	0.2608	-0.1551	0.3250*	0.2171*
	(0.2327)	(0.1748)	(0.2039)	(0.1742)	(0.1130)
Population density	-0.0006	0.0008	-0.0056	0.0016	0.0018
	(0.0012)	(0.0010)	(0.0076)	(0.0014)	(0.0011)
Opposition	-1.8630**	-1.9306***	-1.8894***	-1.9499**	-1.8548***
	(0.8368)	(0.6404)	(0.6147)	(0.7859)	(0.6226)
Election year	1.5608*	1.3886**	1.5852*	2.1564**	1.7614**
	(0.8829)	(0.5904)	(0.9142)	(0.9405)	(0.8657)
Term limit	-1.1973	-1.0420	-1.1834*	-1.7136*	-1.2552*
	(0.9394)	(0.6354)	(0.6507)	(0.9000)	(0.6873)
Children population	-0.0028***	-0.0026***	0.0011	0.0016	0.0003
	(0.0008)	(0.0006)	(0.0053)	(0.0020)	(0.0031)
Agricultural loan	-0.0130	-0.0042	-0.0008	-0.0128**	-0.0058
	(0.0085)	(0.0038)	(0.0025)	(0.0061)	(0.0038)
EDS				-2.3105**	-2.2476**
				(1.0622)	(1.1332)
OPS				3.9879**	3.9966***
				(1.4991)	(1.5326)
Representative				-0.8223**	-0.5550
				(0.3919)	(0.6120)
R^2	0.48	0.41	0.51	0.56	0.64
Rho		0.37	0.66		0.24
BP LM test		145.85***			58.12***
Hausman test			10.42		

Significance levels: *: 10%, **: 5%, ***: 1%. Clustered robust standard errors at the state level are in parentheses. The dependent variable is the net transfer per capita. The results are estimates of equation (1) using various estimators. BP LM test implies Breusch-Pagan Lagrangian Multiplier test. EDS is *Educationally developed state* while OPS is *Oil producing state*. Number of observations is 357 for all the estimators. *Mandate effects* is a dummy included in all the estimators to capture the effect of the regimes on transfers. Source: Author's computation.

The BP LM test result affirms the consistency and efficiency of RE over OLS indicating that there is a panel effect by rejecting the null hypothesis of no panel effect with a Chi-squared statistic of 145.85 at 1 percent level of significance. The result of the Hausman test indicates we cannot reject the null hypothesis that individual component of the error term is not correlated with the regressors with a Chi-squared statistic of 10.42 and a p-value of 0.24. With this, RE is efficient and consistent with a between R-squared of 40 percent explaining variation in *Transfers* and a *Rho* of 0.37, indicating that 37 percent of the variation is due to differences across panels. The Wald statistic of RE estimator demonstrates that our model is a good model

with a Chi-squared statistic of 384.15 for the rejection of the null hypothesis that the regressors are zero at 1 percent level of significance. Based on the result of the Hausman test, other time-invariants variables are introduced into the model. The results are shown in columns 4 and 5. The results in columns 4 and 5 of Table II.4 are considered together. *Own revenue* is positive and statistically significant. *Opposition* is negative and statistically significant, while *Election year* is positive and statistically significant. *Term limit*, *Agricultural loan*, and *EDS* are negative and statistically significant, but under OLS only for *Agricultural loan*. *OPS* is positive and statistically significant, while *Representative* maintains a statistically significant but negative relationship with *Transfer* against *a priori* expectation under OLS alone. The result of BP LM test to determine the efficient estimator between OLS and RE indicates that RE is consistent and efficient over OLS. This suggests that there is a panel effect with a Chi-squared statistic of 58.12 at 1 percent level of significance. The RE in column 5 shows a better fit than RE in column 2 with a between R-squared of 0.64, which implies the model explains variation in *Transfer* by 64 percent. The *Rho* indicates that 24 percent of variation is due to differences across panels. Above all, the Wald statistic, a variant of F statistic, of the RE estimator shows it is a good model with a Chi-squared statistic of 478.54 for the rejection of the null hypothesis that the regressors are zero at 1 percent level of significance.

The results in Table II.5 below indicate that OLS equals RE, but OLS is more efficient for variance across states is zero. This is not unexpected as static panel models are not suitable for estimating models with lagged dependent variable among the regressors. Though the Hausman test indicates that the FE is a better estimator than RE, the focus is on the results from SGMM based on the reasons stated earlier. According to the results under the SGMM model, the lag of *Transfer* is positively correlated with *Transfer,* which implies that there is a persistency issue in intergovernmental allocations. *Own revenue* and *Election year* are positive and statistically significantly correlated with *Transfer* while *Opposition* and *Children population* are negative and statistically significantly correlated with *Transfer*. The model neither suffers from autocorrelation of order 1 nor 2. The Hansen statistic with a p-value of 0.16 indicates that the instruments for the model are valid; the number of instruments used in the model is 38. The discussion of the results will focus on the results from RE in columns 2 and 5 of Table II.4 and SGMM of Table II.5.

The fundamental theoretical consideration of AMS in intergovernmental transfers is equity consideration. The lagged dependent variable is positive and statistically significant, which indicates that the transfers are serially correlated over time. The variable, *Own revenue,* which proxies for fiscal capacity is positive and statistically significant under both RE and SGMM. Though the level of significance and magnitude differ. This suggests that equity consideration is not taken into account in intergovernmental transfers in Nigeria.

It appears the richer states receive more money in transfers than the states with poor fiscal capacity. The more prosperous states get about 600 *naira* more in transfer per capita than the poor states. This is easily discernible in the case of Nigeria as equality accounts for the highest proportion of transfers to states. *Population density* is not statistically significant across the estimators. The variable *Opposition* is negative and statistically significant as expected. This points to the existence of a tactical distribution of intergovernmental transfers by the federal government in favour of core supporter constituencies among states in Nigeria. This suggests that a state in the hand of opposition party member will get about 2,500 *naira* lower in transfer per capita. At the *Election year*, it appears there are more strategic transfers to states. States get more transfers in the region of 2,000 *naira* per capita. This may be an attempt at buying support from the subnational level as the probability of re-election of any incumbent president at the federal level rests on the level of support from subnational units.

Table II.5: A test of politics inherent in intergovernmental transfers in Nigeria using net transfers

Variable	OLS	RE	FE	SGMM
Transfer (t-1)	0.6157***	0.6157***	0.3839***	0.4587***
	(0.0431)	(0.0431)	(0.0316)	(0.0902)
Own revenue	0.2179**	0.2179**	-0.2368	0.6173**
	(0.0887)	(0.0887)	(0.2816)	(0.2649)
Population density	-0.0002	-0.0002	-0.0051	-0.0013
	(0.0004)	(0.0004)	(0.0071)	(0.0010)
Opposition	-0.9193**	-0.9193***	-1.5011***	-2.4478***
	(0.3567)	(0.3567)	(0.4777)	(0.7083)
Election year	1.9500**	1.9500**	1.8652*	2.1356***
	(0.8861)	(0.8861)	(1.0447)	(0.3889)
Term limit	-0.5950	-0.5950	-0.4259	-1.1409
	(0.5462)	(0.5462)	(0.4746)	(1.2708)
Children population	-0.0009***	-0.0009***	-0.0022	-0.0013**
	(0.0003)	(0.0003)	(0.0049)	(0.0006)
Agricultural loan	-0.0087**	-0.0087**	-0.0062	-0.0075
	(0.0042)	(0.0042)	(0.0041)	(0.0108)
R^2	0.70	0.96	0.59	
Rho		0.00	0.66	
BP LM test		0.00		
Hausman test			36.97***	
AR1 (p. value)				0.23
AR2 (p. value)				0.06
Hansen stat (p. value)				0.16
No of instruments				38

Significance levels: *: 10%, **: 5%, ***: 1%. Clustered robust standard errors at the state level are in parentheses. The dependent variable is the net transfer per capita. The results are estimates of equation (2) using various estimators. BP LM test implies Breusch-Pagan Lagrangian Multiplier test. EDS is *Educationally developed state* while OPS is *Oil producing state*. Number of observations is 322 for all the estimators. *Mandate effects* is a dummy included in all the estimators to capture the effect of the regimes on transfers. Source: Author's computation.

Though it has the expected sign, *Term limit* is statistically significant only under column 5 of Table II.4. This implies that states whose governors face a term limit are penalised by reducing transfers to such states in the region of 1,200 *naira* per capita. This may be a strategic decision for the party that is ruling at the centre in case the state is delivered into their hands at the next election. Surprisingly, states with a large population of young children under the age of 15 get lower transfer per capita. The estimated coefficient of *Agricultural loan* has a negative sign, but it is not statistically significant. The variable *EDS* has a statistically significant negative coefficient as expected. This suggests that some money is being channelled to *ELDS* for educational development. The variable, *OPS* is positive and statistically significant from the results in column 5, Table II.4. This is in line with the earlier discussion of revenue sharing in Nigeria. Indeed, the oil-producing states appear to be receiving special status in intergovernmental transfers for being the geese that lay the golden eggs apart from the special 13 percent derivation allocation that they enjoy. Having a higher number of Representatives at the lower house of the national assembly appears not to influence revenue allocation.

5.2 Robustness checks

A robustness check of the regression results is carried out to determine their consistency. The robustness checks for the model are carried out using the gross allocation[34] data for the same period, the year 2007 to the year 2016. The difference in the gross allocation and net allocation has been explained earlier in this paper.[35] Given that the information is on subnational governments with limited capacity to commit to international borrowings due to possible default that may affect the national credit ratings, the federal government acts to protect the nation and creditors by always guaranteeing repayments of loans taken from foreign institutions. The repayment of debts may also be in respect of other financial commitments and obligations either locally or internationally. In order to ensure that the creditors get their repayments, the federal government deducts at the source from the amount due to states in intergovernmental transfers the value of due repayment obligations from their allocations.[36] Sometimes, deductions may be due to joint projects between states and the federal government.

[34] As explained earlier (under data, econometric issues, and estimation strategy), the amount due in 13 percent special allocation for the mineral producing states are deducted to avoid biasedness which may confound the results of the econometric estimation. See Figure II.B1.

[35] See discussion under data, econometric issues, and estimation strategy.

[36] Virtually all the states had repayment obligations that were repayable during the periods covered in this study. So, using the gross allocations is assumed a good approach to check the robustness of the results given that our panel data covers a short period.

Table II.6: A test of politics inherent in intergovernmental transfers in Nigeria using gross transfers

Variable	OLS	RE	FE	OLS	RE
Own revenue	0.7650***	0.2485	-0.0582	0.3798*	0.2289*
	(0.2648)	(0.1675)	(0.1981)	(0.2057)	(0.1200)
Population density	-0.0007	0.0014	-0.0031	0.0021	0.0024
	(0.0012)	(0.0012)	(0.0070)	(0.0018)	(0.0015)
Opposition	-2.0964**	-1.9470***	-1.8832***	-2.1849**	-1.8963***
	(1.0204)	(0.6980)	(0.6624)	(0.8742)	(0.6714)
Election year	1.7728*	1.3624***	1.4785*	2.3844**	1.6590**
	(1.0064)	(0.5050)	(0.7833)	(1.0230)	(0.7762)
Term limit	-1.4564	-1.0200*	-1.1030*	-2.1018*	-1.2149**
	(1.0876)	(0.5409)	(0.5494)	(1.0704)	(0.5999)
Children population	-0.0034***	-0.0030***	-0.0005	0.0009	-0.0010
	(0.0011)	(0.0009)	(0.0046)	(0.0019)	(0.0030)
Agricultural loan	-0.0156	-0.0019	0.0008	-0.0152*	-0.0037
	(0.0116)	(0.0035)	(0.0025)	(0.0085)	(0.0038)
EDS				-2.9548*	-2.8965*
				(1.4783)	(1.5455)
OPS				5.1134**	5.1009**
				(1.9876)	(2.0449)
Representative				-0.7787**	-0.3906
				(0.3705)	(0.5970)
R^2	0.47	0.37	0.53	0.58	0.52
Rho		0.53	0.67		0.36
BP LM test		344.36***			176.06***
Hausman test			10.94		

Significance levels: *: 10%, **: 5%, ***: 1%. Clustered robust standard errors at the state level are in parentheses. The dependent variable is the gross transfer per capita. The results are estimates of equation (1) using various estimators. BP LM test implies Breusch-Pagan Lagrangian Multiplier test. EDS is *Educationally developed state* while OPS is *Oil producing state*. Number of observations is 357 for all the estimators. *Mandate effects* is a dummy included in all the estimators to capture the effect of the regimes on transfers. Source: Author's computation.

What is due to a state is the gross allocation, while the balance remaining after the deduction of due repayment obligation is the net allocation. The net allocations are used in the main regression. Given that the debt obligations (the gap between gross allocations and net allocations) may mask the politics inherent in intergovernmental transfers on the variables of interest, it thus becomes imperative to use gross transfers in checking the correctness or otherwise of the results of the main regressions. The robustness checks are therefore conducted on gross transfers to various states using the same estimation techniques as in the main regressions. This robustness test makes it possible to confirm whether the results of the main regressions are driven by the information used in their econometric estimation. The behaviour of the variables in the models using data on gross allocations remains stable as under the main regressions using net allocations. The coefficients of the regression results show little or no change in magnitude and direction. This points to the fact that the results are not driven by the data used in the econometric estimation. The results are displayed in Table II.6 above and Table II.7 below. It confirms Nigeria behaves like some other federal states where strategic considerations override normative reasons in revenue sharing.

Table II.7: A test of politics inherent in intergovernmental transfers in Nigeria using gross transfers

Variable	OLS	RE	FE	SGMM
Transfer (t-1)	0.6748***	0.6748***	0.2848***	0.5223***
	(0.0355)	(0.0355)	(0.0619)	(0.0997)
Own revenue	0.2388**	0.2388***	-0.1723	0.7603**
	(0.0880)	(0.0880)	(0.3008)	(0.3321)
Population density	-0.0002	-0.0002	-0.0038	-0.0018
	(0.0003)	(0.0003)	(0.0077)	(0.0013)
Opposition	-0.9101**	-0.9101**	-1.6621***	-2.2123***
	(0.3718)	(0.3718)	(0.6085)	(0.7754)
Election year	2.1731**	2.1731**	1.9985*	2.3965***
	(0.9126)	(0.9126)	(1.0230)	(0.4652)
Term limit	-0.8184	-0.8184	-0.4637	-1.6958
	(0.5890)	(0.5890)	(0.3936)	(1.4783)
Children population	-0.0009**	-0.0009***	-0.0026	-0.0014
	(0.0004)	(0.0004)	(0.0051)	(0.0009)
Agric. loan	-0.0093*	-0.0093*	-0.0051	-0.0089
	(0.0049)	(0.0049)	(0.0038)	(0.0090)
R^2	0.73	0.97	0.59	
Rho		0.00	0.67	
BP LM test		0.00		
Hausman test			69.87***	
AR1 (p. value)				0.25
AR2 (p. value)				0.06
Hansen stat (p. value)				0.15
No of instruments				38

Significance levels: *: 10%, **: 5%, ***: 1%. Clustered robust standard errors at the state level are in parentheses. The dependent variable is the net transfer per capita. The results are estimates of equation (2) using various estimators. BP LM test implies Breusch-Pagan Lagrangian Multiplier test. EDS is *Educationally developed state* while OPS is *Oil producing state*. Number of observations is 322 for all the estimators. *Mandate effects* is a dummy included in all the estimators to capture the effect of the regimes on transfers. Source: Author's computation.

6. Conclusion

This study seeks to examine the existence of strategic and political considerations in intergovernmental transfers in Nigeria. Nigeria is a multiparty federal democracy. The normative theories of fiscal federalism recommend equity and efficiency for intergovernmental transfers. In practice, it has been established that politics influences the allocation of intergovernmental transfers. This has led to the establishment of mechanisms to remove the influence of politics in intergovernmental transfers through the formulaic revenue sharing arrangement and the establishment of an independent body to oversee the sharing of revenues. The existing practice in Nigeria conforms to the formulaic revenue sharing arrangement under the supervision of a constitutionally recognised independent organisation, RMAFC. The current institutional arrangement evolves mainly from an overused system of ad-hoc committees in response to constitutional and political developments for revenue sharing in Nigeria.

Notwithstanding the existing practice, there is evidence of political targeting in intergovernmental transfers in Nigeria, as observed by Khemani (2007) in the case of South Africa with a similar arrangement to Nigeria. The intergovernmental transfer does not conform to equity consideration of the AMS principle of equity (Musgrave, 1999; Oates 1972, 1999, 2005). This result is similar to findings from the studies by Caldeira (2012), Banful (2011), and Allers and Ishemoi (2011) on sub-Saharan African countries. The poorer states and the states with higher fiscal needs are not favoured in revenue sharing (Boex & Martinez-Vazquez, 2005). There seem to be a grand strategic consideration under the formulaic revenue sharing arrangement being supervised by an independent body in Nigeria. The results point to the existence of distributive politics in intergovernmental transfers to support core supporter constituencies and the use of transfers to expand the political base by the central government. The existing system of intergovernmental transfers lends itself to political manipulations and makes the use of intergovernmental transfers for opportunism possible, especially when the president can override the constitutional body.

The distributive allocation is done through large transfers to subnational governments around the election year. In additions, states under the control of the opposition party members get lower transfers than core supporter constituencies of the party of the government at the centre (Dixit & Londregan, 1996; Veiga & Pinho, 2007). More so, a state whose governor faces a term limit gets lower transfers. Of course, this may be in anticipation that a member of the party at the centre will emerge the new governor in the state. Such fund may be released to the state to provide a launchpad for the new government in the provision of services for political capital. The higher transfers being enjoyed by the oil-producing states are in line with the submission of the credible threat of secession in a federation by Treisman (1996). The South-South region of Nigeria, where oil is produced, has threatened succession over oil revenues many times. The current large transfers to the area are a product of series of agitations and threats to secede from the Nigerian state. For this, they are not only enjoying the 13 percent derivation allocation, they are also specially treated as this study reveals. It is recommended that states with greater fiscal needs and weak fiscal capacity should be allocated more resources to deal with their challenges. Equality is not equity as the needs of states differ. The proportion allocated to equality in intergovernmental transfers at the horizontal level should be reviewed in favour of other variables that recognise the peculiar needs of subnational jurisdictions. Transfers should respond to the level of inequality among states. Openness in the appointment of officers and operations of RMAFC should be followed. This will ensure that the formula-based system of revenue allocation works, and it will help to restore RMAFC to its rightful position. There is also the need to stick to the constitutional provision of the regular review of the formula.

Appendix A

Table II.A1: Descriptive statistics for the year 2007

Variable	Mean	St. Dev.	Min.	Max.
Transfer	11,399.88	3,927.47	5,931.73	27,292.92
Own revenue	1,643.92	2,478.99	120.27	13,647.10
Population density	307.77	425.36	40.77	2,482.59
Children population	1,620.00	710.71	712.87	3,930.00
Agricultural loan	48.24	51.25	5.56	230.35
Representative	9.94	4.37	5.00	24.00
Opposition	0.22		0	1
Term limit	0.64		0	1
Educationally developed state	0.36		0	1
Oil producing state	0.25		0	1

Notes: The data is sourced from CBN, Joint Tax Board (JTB), National Bureau of Statistics (NBS), and Office of the Accountant General of the Federation (OAGF). The number of observations is 36, the number of states is 36, and T = 1. The year, 2007 is a general election year. Children population is in '000. *Transfer*, *Own revenue* and *Agricultural loan* are in per capita term. All dummy variables are constructed by the author. Source: Author's computation.

Table II.A2: Descriptive statistics for the year 2016

Variable	Mean	St. Dev.	Min.	Max.
Transfer	3,157.24	981.10	647.67	5,660.31
Own revenue	1,756.02	2,414.17	235.84	12,421.47
Population density	406.95	566.08	52.93	3,311.18
Children population	2,140.00	960.31	925.47	5,290.00
Agricultural loan	23.11	26.15	0.37	149.26
Representative	9.94	4.37	5.00	24.00
Opposition	0.36		0	1
Election year	0.06		0	1
Term limit	0.06		0	1
Educationally developed state	0.36		0	1
Oil producing state	0.25		0	1

Notes: The data is sourced from CBN, Joint Tax Board (JTB), National Bureau of Statistics (NBS), and Office of the Accountant General of the Federation (OAGF). The number of observations is 36, the number of states is 36, and T = 1. Children population is in '000. *Transfer*, *Own revenue* and *Agricultural loan* are in per capita term. All dummy variables are constructed by the author. Source: Author's computation.

Table II.A3: The Structural Evolution of the Nigerian Federalism, 1960-2016

Year	Autonomous States	Semi-autonomous State	Local Government Areas
1960*	3 (Regions)	-	-
1963*	4 (Regions)	-	-
1967	12	-	-
1970	12	-	299
1976	19	-	299
1979	19	-	301
1981	19	-	781
1984	19	-	301
1987	21	-	449
1991	30	1	593
1996	36	1	774

Notes: *Under the regional system, there was no uniform system of local government administration in Nigeria as each region had its system of local administration. Hence, the number of local government areas could not be ascertained. Until 1991, Lagos served as the seat of Federal Government; and, it remained the seat of the federal administration when it was carved out of the Western Region as a state in 1967. Though FCT, Abuja was created in 1976, its semi-autonomous status came into force in 1991 when the Federal Capital was relocated from Lagos State to Abuja. Of the listed 774 local governments areas in Nigeria, six are municipal council areas in the semi-autonomous region of FCT, Abuja. Some states have tried to alter the number of local government areas within their jurisdictions since 1999, albeit with little or no success. This is because any change to the number of municipalities in any state must be recognised and passed into law by the federal legislators, which involves alteration of some sections of the 1999 Constitution. Though a federal court ruled in favour of states on the matter, the states still find it challenging to increase the number of their municipalities and get them recognised according to the law. See sub-section 3.1 Chapter Two for detailed discussion. Source: Akindele, Olaopa, and Obiyan (2002) and author's addition.

Table II.A4: Assignment of Expenditure Responsibilities in Nigeria by the 1999 Constitution

Assignment	Federal	States	Local Governments
Defence	National defence		
Foreign Affairs	Diplomatic and Consular missions, international treaties, foreign policy		
Public Order	National police, security services, prisons	State public order	
Trade and Commerce	Commercial policy, banking, insurance, bankruptcy, international trade, interstate trade	Intrastate trade and commerce	Local markets, slaughterhouses, local economic development
Natural Resources	Mines and mineral, including oil and gas surveying and mining		Natural resources development other than mineral exploitation
Agriculture and Fisheries	Promotion of agricultural research and production, fishing rights	Establishment of research centres for agricultural studies	Local agricultural development
Health	Federal health policy	State health policy	Local health services
Education and Science	University and professional education, technological research, national statistics	Regulation of primary education, provision of post-primary education, university and professional education, scientific and technological research	Provision and maintenance of the primary school, adult and vocational training
Transportation network and public transportation	Aviation policy and airports, railways, federal highways	State highways, public transit	Local roads and highways, local public transit

Notes: The table contains information on major expenditure responsibilities of each level of government as defined by the 1999 Constitution of the Federal Republic of Nigeria. See sub-section 3.1 Chapter Two for detailed discussion. Source: Alm and Boex (2002 p. 44); the Nigerian 1999 Constitution.

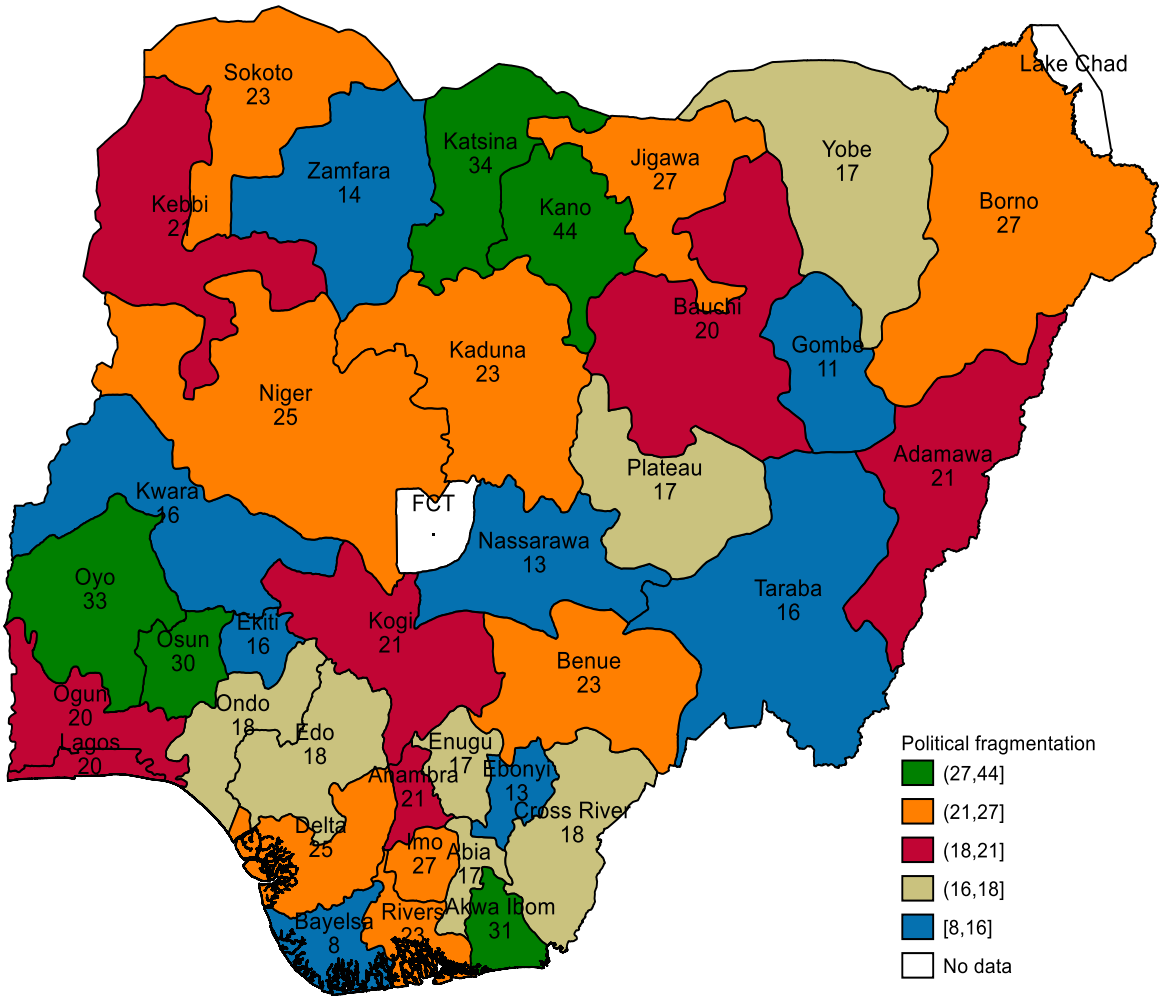
Table II.A5: Revenue Assignment

Federal Government	State Government	Local Government
1. Companies income tax	1. Personal income tax (Pay-As-You-Earn and Self-Assessment)	1. Shops and kiosks rates
2. Withholding tax on companies for non-residents, and FCT Abuja	2. Withholding tax on individuals	2. Tenement rates
3. Petroleum profit tax	3. Capital gains tax on individuals	3. Liquor license fee
4. Mining rents and royalties	4. Stamp duties on individuals	4. Slaughter slab fees
5. Import duties	5. Gambling and lottery taxes	5. Marriage, birth, death registration fees
6. Export duties	6. Road taxes	6. Street naming fees (excluding state capital)
7. Excise duties	7. Business premises registration fee	7. The right of occupancy fees (excluding state capital)
8. Value-added tax	8. Development levy on individuals	8. Market taxes and levies (excluding state-owned)
9. Education tax	9. Street naming registration fee for the state capital	9. Motor park levies (excluding state-owned)
10. Capital gain tax for non-residents, corporate bodies, and residents of FCT Abuja	10. Land registration and survey fees	10. Domestic animal license fees
11. Stamp duties for non-residents, corporate bodies, and residents of FCT Abuja	11. The right of occupancy fees	11. Bicycle, truck, canoe, cart fees
12. Personal income tax for military and police personnel, non-residents, and residents of FCT Abuja	12. Market fees	12. Cattle tax
13. Miscellaneous revenues (rents, returns on investments, etc)	13. Miscellaneous revenues (rents, returns on investments, etc)	13. Merriment and road closure levy
		14. Radio and television license fees
		15. Vehicle radio license fees
		16. Wrong parking charges
		17. Public convenience, sewage and refuse disposal fees
		18. Customary burial ground permit fees
		19. Religious places establishment permit fees
		20. Signboard/advertisement fees

Notes: The table contains information on revenue-raising powers of each tier of the government of the federation in Nigeria as defined by the 1999 Constitution of the Federal Republic of Nigeria. See sub-section 3.1 Chapter Two for detailed discussion. According to the table, the federal government is left with the most productive sources of revenues. Each tier of government collects taxes as laid down in the constitution and presented in the table. But, for taxes like PAYE, Capital Gain Tax, and Stamp Duties, the federal government retains jurisdiction over legislation, while the administration is shared with states (Phillips, 1997 p. 13). Source: Alm and Boex (2002 p. 46) with addition from the author.

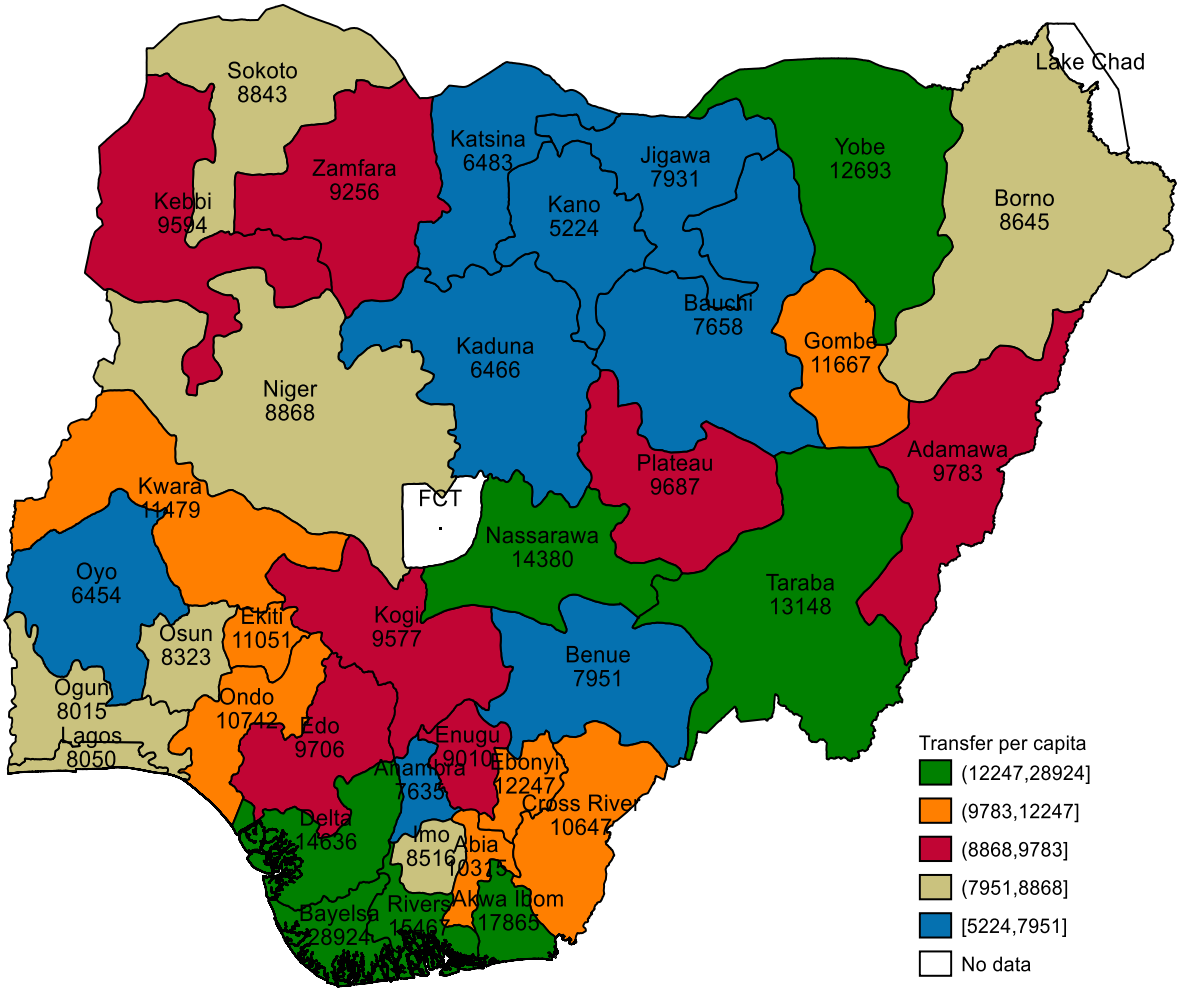
Appendix B

Figure II.B1: A map showing the number of local government areas in each state in Nigeria, 2007-2016



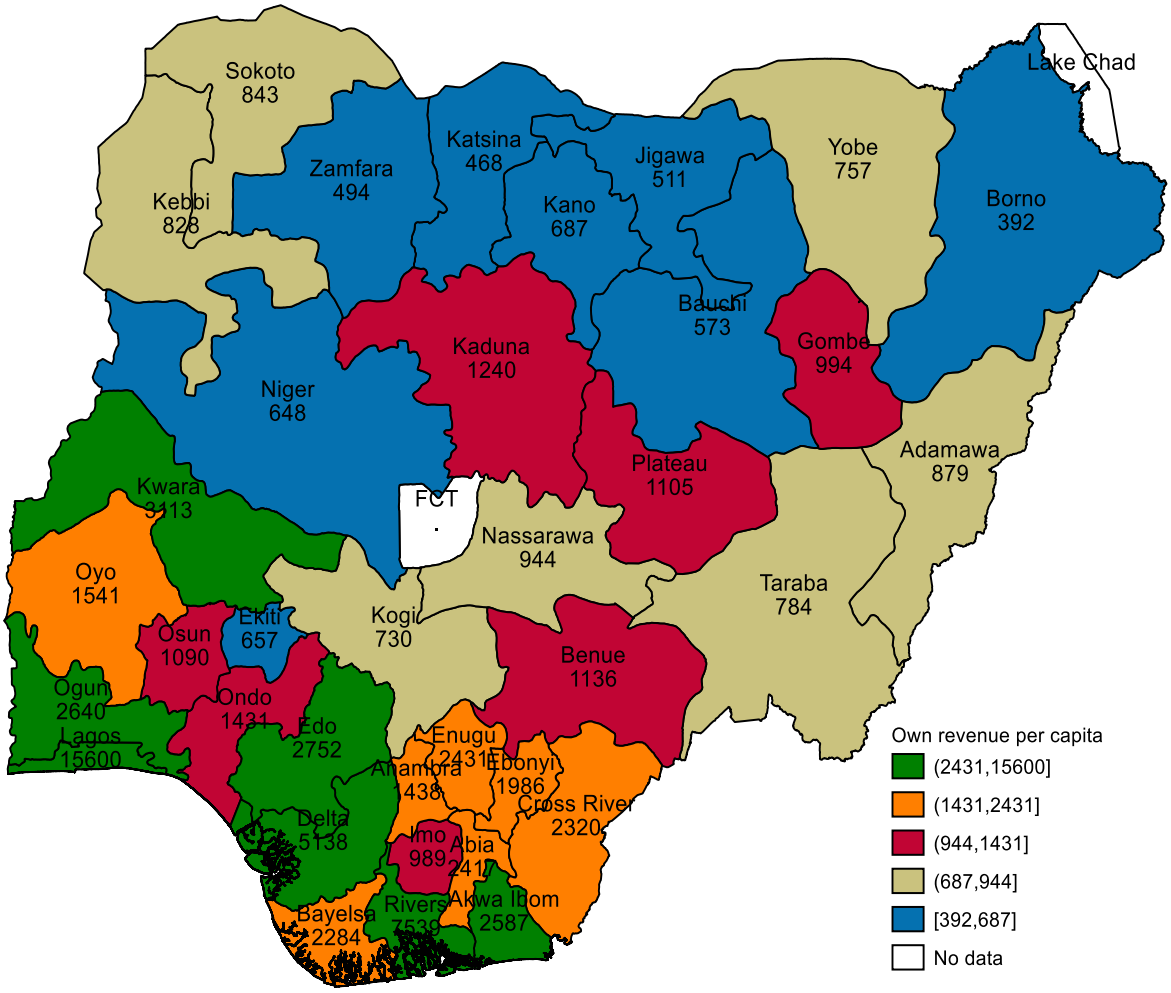
Notes: Under each state of the Nigerian federation are local government areas listed in the Nigerian 1999 Constitution. The 36 states with the number of local government areas in each state are shown in the above map of Nigeria. See the evolution of the local government areas in Table II.A3 (p. 39). The local government areas are created as the third level of administration in Nigeria. They determine a few of federal government's projects in states. The blue states are the group of state with the least number of local government areas, while the green states have the highest number of local government areas. Though the FCT has 6 local government areas, we do not account for it in this study because of FCT's semi-autonomous status. The North-East area without data is a body of water known as Lake Chad. Source: Author's computation using SPMAP in STATA 15.

Figure II.B2: A map showing the average real per capita gross intergovernmental transfers to states in Nigeria, 2007-2016



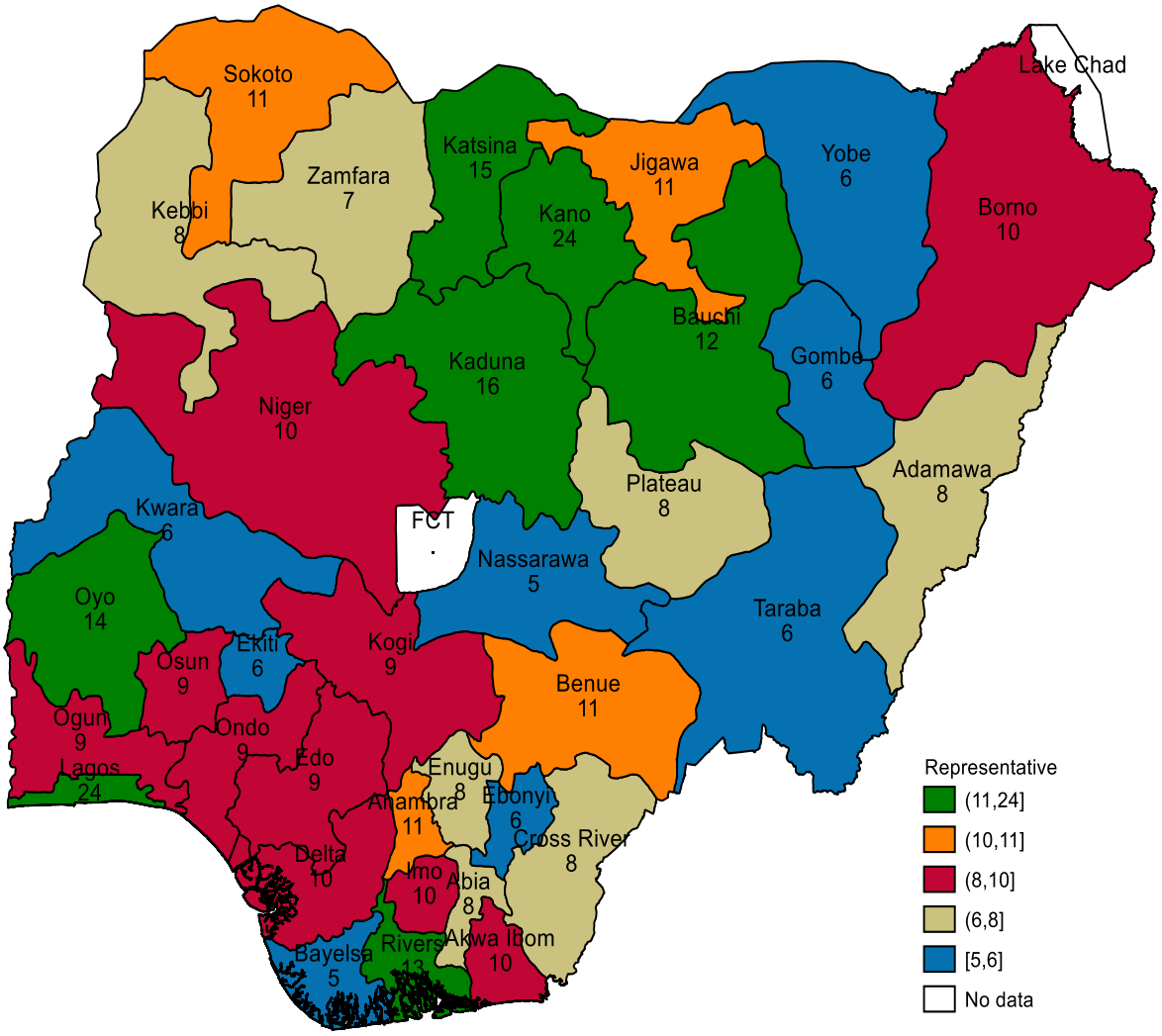
Notes: The 36 states with the average of gross transfers per capita received as transfers from the federal government of Nigeria from 2007 to 2016 are shown in the map above. The gross transfer to each state is determined based on the variables shown in Table II.2 (p. 17) after the vertical allocation to state governments is determined based on the vertical allocation formula in column 12, Table II.1. The gross transfers per capita (in the local currency, *naira*) is arrived at by dividing the gross transfers to a state by the population of the state. The real gross transfers per capita in the periods under study ranges from ₦5,224 to ₦28,924 (₦ *naira* sign). For comparability, the figure shown here per capita does not include 13 percent derivation allocation to states that are entitled to it (see footnote 31 for the list of oil-producing states). The blue states receive the least transfers per capita, while the green states receive the highest transfers per capita. Some of the green states are oil-producing states, especially all the four southernmost green states. The FCT and the area to the North-East are geographical locations without data. FCT, being a semi-autonomous state, is not included in this study. Source: Author's computation using SPMAP in STATA 15.

Figure II.B3: A map showing the average real own revenues per capita of states in Nigeria, 2007-2016



Notes: The amount generated by each state is termed own revenues. The average own revenues per capita (in the local currency, *naira*) in the periods under study ranges from ₦392 to ₦15,600 (₦ *naira* sign). The blue states generate the least own revenue per capita, while the green states generate the highest own revenue per capita. The green states are all located below the Niger River. Some of these states also get large transfers per capita from the federal government in Nigeria. Besides, some of them are oil-producing states which enhances their capacity to raise higher own revenues. The FCT and the area to the North East are geographical locations without data. FCT, being a semi-autonomous state, is not included in this study. Source: Author's computation using SPMAP in STATA 15.

Figure II.B4: A map showing the number of federal representatives from each state in the lower house of the national assembly in Nigeria, 2007-2016



Notes: The passage of the national budget must receive the approval of both chambers of the Nigerian national assembly in any fiscal year. Nigeria operates a bicameral legislature at the national level. The two chambers of the national assembly are the Senate and the House of Representatives which are also referred to as the upper chamber and lower chamber respectively. While the Senate is based on equal representation of all states, representation at the House of Representatives is determined by geographical size and population of each state. This representation in national parliament determines some benefits from the federal government to states. The blue states are less represented while the green states have the highest number of representatives. The FCT, being a semi-autonomous state, is not included in this data. The North East area without data is a body of water known as Lake Chad. Source: Author's computation using SPMAP in STATA 15.

Chapter III: Intergovernmental Transfers and Own Revenues of Subnational Governments in Nigeria

1. Introduction

The decentralised governance arrangement engenders a system of cooperative and interdependent governments. This arises out of the need to share resources among levels of government making up the federation. The revenue assignment under federalism[37] sometimes gives much power over revenue-raising to the central government as compared with subnational governments for many reasons, which include the capacity for revenue collection. The result is that the revenues of subnational governments are barely enough to cope with their constitutional responsibilities. This, apart from externalities and/or equity consideration, necessitates the grant-giving function of the central government. However, grants do have an income effect on the grant-receiving governments. It raises the income of the recipient government, and the government could behave like any rational individual in its revenue and expenditure choices. In other words, the recipient government could reduce effort in its revenue mobilisation since it is cheaper to receive transfers than to embark on revenue-raising within its jurisdiction.

The models of intergovernmental transfers under a decentralised governance arrangement have predicted that federal transfers amount to a reduction of tax liabilities for residents of subnational jurisdictions as transfers will crowd out local revenues (Bradford & Oates, 1971a, 1971b). Empirical studies of the effect of transfers on own revenues of subnational jurisdictions under decentralisation in developed countries have shown that transfers do result in a lower tax effort by subnational governments (Zhuravskaya, 2000; Buettner & Wildasin, 2006), including a low level of efficiency in resource usage (Kalb, 2010). Notwithstanding this empirical finding, studies have shown that subnational governments in developed countries generate higher tax revenues as a proportion of transfers when compared with developing countries.[38] The situation in developing countries is quite different. The subnational governments depend on the central government for almost 70-95 percent of operating revenues in many developing countries.[39]

Though decentralisation has been touted as a means through which some of the challenges of development in developing countries could be overcome (Faguet, 2008; Smoke, Loffler & Bosi, 2013), warnings by Prud'homme (1995) and Reinikka and Svensson (2004) have shown that decentralisation does not automatically solve development problems in developing countries due to the motives behind

[37] Federalism, as used here, is not based on the constitutional declaration but the structure of the public sector (see Oates, 1972). Thus, federalism and decentralisation are used interchangeably.

[38] In the US, only 20-25 percent of municipal operating revenues come from states while the federal government contributes only about 5 percent of general municipal revenues (National League of Cities, https://www.nlc.org/revenue-from-intergovernmental-transfers, last accessed April 12, 2019)

[39] The figure for the Philippines is 85 percent (Troland, 2016), 91 percent for Tanzania (Masaki, 2018), 90 percent for Lesotho, 88 percent for Uganda, 69 percent for Ghana, and 60 percent for Malawi (Fjeldstand & Heggstad, 2012).

decentralisation vis-à-vis developed countries. The efficiency consideration is not the primary motive behind decentralisation in many developing countries (Bardhan, 2002), thereby giving rise to local capture, corruption, weak state because of excessive fragmentation, poor fiscal capacity, debt crisis, among other challenges. More importantly, what appears to be decentralisation in some developing countries is nothing but fragmentation. This arises out of the need to please local elites or ethnic champions. Thus, transfers to subnational governments are used as directed by the elites but not for capacity building and provision of services. Under such circumstances, transfers will crowd out own revenues of subnational governments as those that are denied essential services will revolt against or evade tax payment.

Subnational governments in Nigeria fit into the above picture. In view of this, Nigeria is an ideal setting to test whether transfers crowd in or crowd out own revenues of subnational governments. The focus of this study is on the second-level administrative units, which are known as states. This study focuses on the second level of administration because own revenues for local government areas are neither reported nor published. They receive transfers from the federal government, but they are less accountable for many reasons.[40] States are not entirely different from local governments in the management of transfers. While transfers bear almost all operating costs of local governments, states are dependents on federal transfers in the range of 75-95 percent of their budgeted revenues.[41]

This paper is the first to empirically examine the causal effects of federal transfers on own revenues of state governments in Nigeria using panel data. Besides, there is a need to study the Nigerian situation in the face of existing studies on some African economies with a similar structure to Nigeria (Morgues & Benin, 2012; Caldeira & Rota-Graziosa, 2014; Masaki, 2018). The collection of taxes rests on fiscal capacity and administrative competence (Besley & Persson, 2013) which are dependent on federal transfers to state governments. Federal transfers are endogenous to own revenues of subnational governments because transfers may be used to provide essential services that may yield higher own revenues to subnational governments. The study employs an instrumental variables (IV) model due to the endogeneity issue to identify the causal effect. Thus, we use distance to Federal Capital Territory (FCT) and fragmentation (the number of local government areas in each state) as instruments for federal transfers. The empirical results show that transfers crowd out own revenues of subnational governments in Nigeria. The empirical finding is anchored on corruption[42] (Prud'homme, 1995; Reinikka & Svensson, 2004; Brollo *et al.*, 2013) which

[40] Local governments in Nigeria are the ideal example of what Reinikka and Svensson (2004) referred to as local capture. Many local governments have no published account of operations for many years.

[41] Except Lagos State, almost all other states generate less than 25 percent of their annual budgets. See Table III.1.

[42] Corruption is a major issue at subnational levels in Nigeria due to the circumstances surrounding the evolution of states and local government areas. Many subnational past executives are facing cases of corruption in courts. This is made worse by the constitutional provision which guarantees protection from criminal offence while in office. This period enables them to tinker with evidence that could have nailed them during prosecution.

leads to vote buying during elections (Khemani, 2015), high level of informality of subnational economies (Joseph-Raji, 2015), resource dependence (Caselli & Michaels, 2013), and partial fiscal decentralisation which imposes limits on revenue-raising powers of the subnational governments and causes them to depend on the federal government for a huge chunk of their budgeted revenues (Borges, Brueckner, & Rattsø, 2014).

This paper is organised as follows. Section two reviews the literature on theoretical and empirical issues on the relationship between transfers and own revenues of subnational governments. Section three is devoted to the evolution of subnational units and the drive for own revenues in Nigeria. Section four treats the empirical model, data, and estimation strategy. In section five, the results are discussed. The study is concluded in section six.

2. Intergovernmental transfers and local revenue generation: A literature survey

The raison d'être of a multi-level government is to bring government closer to the people, particularly where there are substantial socio-cultural differences among the people, including efficiency in the choice of programs (Bahl & Bird, 2008; Bird & Smart, 2002; Oates, 1972, 1999). For this objective to be realised, an essential component of the federal system of government is intergovernmental transfers. This exists under the federal government arrangement for many reasons. Among other reasons, intergovernmental transfers are made to support the operation of subnational governments, especially where this might have been impossible without such support (Oates, 1972). It makes possible the development of local capacity, helps local governments to focus on governance, and promotes even development among the subnational units (Faguet, 2008). Where there is an imbalance between the expenditure responsibilities and the revenue-raising capacity of subnational governments, intergovernmental transfers are allocated to bridge the gap. More importantly, it helps in the attenuation of the differences in local fiscal capacity. By and large, fiscal decentralisation improves efficiency in the allocation of resources (Oates, 2007).

The substitutability of intergovernmental transfers for local revenues makes local fiscal autonomy a difficult objective under a decentralised governance arrangement. The good intention behind intergovernmental transfers is threatened by issues such as excessive stimulative spending effect of transfers by subnational governments much more than income from own revenue sources, a phenomenon dubbed "flypaper effect" (Hine & Thaler, 1995); fiscal illusion, where both the revenue and the cost of government are not transparent, and taxpayers do not perceive the true cost of services provided in taxes by the government (Hine & Thaler, 1995); tax export, whereby a jurisdiction shifts its tax burden to a richer neighbouring

jurisdiction (Musgrave, 1999). Also, intergovernmental transfers without a hard budget constraint encourage excessive spending, which may result in debts and engender macroeconomic issues. Thus, local revenue mobilisation is germane to a robust federal system (Bird & Smart, 2002).

For all the issues raised above, it appears there is a negative impact of unconditional intergovernmental transfers on the efficiency of resource use and own revenue mobilisation at the subnational level under a multi-level government. This follows from the logic that "if a community required to finance its own public programs through taxation, residents are more likely to weigh the benefits of the programs against its actual costs (Oates, 1972 p.13)." This requires the local residents to be circumspect of their choice of programs through their votes because of the tax implication. The early theoretical treatise on the crowd-out effect of unconditional central government transfers was developed by Bradford and Oates (1971a, 1971b). They posit that unconditional transfers by the central government amount to individual tax reduction at the subnational units which discourage rather than encourage own revenue mobilisation by subnational governments. The lump-sum unconditional transfers have an income effect on the grant-receiving governments (Bradford & Oates, 1971a). Wilde (1968) advances a similar view that the local government can use the general grant in a manner which makes it appears like tax cuts for local residents. It does have a stimulating effect on the expenditure decisions of the grant-receiving governments under a median-voter arrangement. This perverts the system of intergovernmental fiscal relations under the decentralisation arrangement as it opposes the principle that spending jurisdictions should be responsible for their finance (Musgrave, 1999). This leads to an inefficient choice of programs and spending because an average median voter wants more services but less burden in tax payment.

The view that the central government unconditional transfers will crowd out local revenues is supported by some empirical studies of the impact of intergovernmental transfers on own revenue mobilisation by subnational governments in developed countries. This challenge of decentralisation is assumed to be widespread among decentralised developing countries. In a study on the US, Buettner and Wildasin (2006) conclude from their extensive research on municipalities across the US that transfers from the central government crowd out local revenues of municipalities. Zhuravskaya (2000) submits that intergovernmental fiscal relations among levels of government provide no incentives to local governments to increase own revenue mobilisation in Russia. Without local ownership through an aggressive own resource generation, expenditure efficiency may be difficult to achieve under decentralised governance arrangement (Bird & Smart, 2002). Indeed, Kalb (2010) finds that intergovernmental transfers produce a negative effect on the cost-efficiency of municipalities in Germany. This is mainly due to the "exploitation of fiscal common." Sobel

and Crowley (2014) report that federal grants in the US result in an increase in state and local future tax income in the region of 40 cents per dollar received in the previous year. Unlike the earlier studies, they find that grants from the central government lead to an increase in revenue mobilisation efforts of subnational governments. Zhang (2013) finds that intergovernmental transfers, in various forms, stimulate local revenue efforts of Chinese local governments. Lago-Peñas (2008) concludes that Spanish municipalities react to a reduction in grants by increasing own revenues.[43]

A few studies have been conducted on developing countries with mixed results. Based on a study conducted on Ghana, Morgues and Benin (2012) conclude that, notwithstanding the incentive scheme embedded in unconditional intergovernmental transfers, the transfer scheme crowds out own revenues of district governments. On the other hand, Caldeira and Rota-Graziosa (2014) find that revenues from the customs allocated to local governments unconditionally lead to an increase in own revenue generation by local governments in the case of Benin. A similar effect is reported on transfers to local governments in the Philippines by Troland (2016). He anchors the effect on the issues of fixed cost and credit constraints associated with the capacity for revenue collection, which intergovernmental transfers can help to surmount. Also, Masaki (2018) concludes on a study in Tanzania that intergovernmental transfers crowd in local revenues, especially in rural areas.

3. Subnational governments and the drive for own revenues in Nigeria

3.1 The political economy of decentralisation in Nigeria

The modern federal system of government in Nigeria has its root in the Nigerian pre-Independence Constitution of 1946. At that time, Nigeria was a federation of three regions, including the Colony of Lagos. The federal structure of three regions was maintained until 1963 when the fourth region was created. The political crises after the attainment of the republic in 1963 led to the introduction of states in 1967. In 1967, under the military government, Nigeria had 12 states. Phillips (1991) posits that "military governments tend to be unitary, regardless of whether the country is constitutionally a federation." Of course, the coming of the military into the running of the affairs of government brought in some degree of centralisation in the federal system, which has not been wholly eliminated. In what followed, the existing structure for revenue generation for regions/states had to be switched in favour of the federal military government (Chapter Two, Table II.A5 p. 41).

[43] This study addresses the asymmetric relationship in intergovernmental transfers.

With the central allocation of resources and political powers under the military system of government, usually associated with corruption and arbitrariness, the coming of the military did not bode well for the Nigerian federal system of government. The federal structure that had been laid pre-independence had to give way to centralisation. The creation of states and local government areas, therefore, became means of political settlements and perpetuating selves in power among the top echelon of the military. The patterns of state and local government creation gave no attention to the economic survival of states but political considerations. This occurs because the economic resources for running different regions before the coming of the military government had been brought under the federal military government and thus shared by military fiats. This was followed by reckless fragmentation at both second and third levels of administration.

And, regions with more senior military officers in the Nigerian Army get more fragmented. This happens because expenditures chosen in some states are paid for by other states through taxes and other federal incomes raised from those states. Thus, Nigeria went from a country of three regions in 1960 to 36 states, a semi-autonomous state, Federal Capital Territory (FCT) and 774 local government areas in 1996, the last time a significant fragmentation was effected (Table II.A3 p. 39). The states are further grouped into regions for political purposes. There are six regions: North Central, North East, North West, South South, South East, and South West. While North West has 7 states, South East comprises of 5 states. All other regions have 6 states. Following the incessant fragmentation of states and local governments, the revenue allocation formula had to be regularly adjusted. Between 1946 and 2004, Nigeria has had 18 different vertical revenue allocation formulae.[44] Political considerations have largely informed the changes in vertical revenue allocation formula rather than sound economic criteria with the intention of weaning the subnational governments off dependence on transfers from the federal government.

The current vertical allocation formula has been in use since 2004. The formula allocates 52.68 percent, 26.72 percent, and 20.60 percent to the federal government, state governments, and local governments, respectively (column 12, Table II.1 p. 16). The vertical allocation formula is applied to all distributable federal revenues after some statutory deductions have been made. These special deductions include 13 percent derivation fund to be shared among the oil-producing states in the country in addition to a share of distributable 26.72 percent allocation to all states.[45] The existence of the vertical allocation formula necessitates the existence of a horizontal sharing formula for subnational units in Nigeria. The horizontal revenue sharing formula for sharing the states' and local governments' shares of the vertical allocation

[44] See Phillips (1991) for a detailed discussion of pre-1990 federal finance issues in Nigeria.

[45] The 13 percent derivation fund is no longer limited to oil but also revenues from other profitable mineral resources. The basis for sharing the 13 percent derivation fund is the number of productive oil wells in each oil-producing state. Those states benefiting from this special fund are located mainly in the South-South region, and this accounts for the high revenue profile of the region in Figure III.2.

allocates 40 percent to equality, 30 percent to population, 10 percent to landmass and terrain, 10 percent to social development factors (which is further broken down to 4 percent for education, 3 percent for health, and 3 percent for water), and 10 percent to internal revenue effort (Table II.2 p. 17). It is, however, not clear how the internal revenue effort is treated.[46] On the whole, all intergovernmental transfers based on the afore-mentioned formula attach no condition for the grant-receiving governments.

The fragmented states and local government areas are rather conduits for channelling states' resources into the hands of a few elites at the state and local government levels. This gives room for local capture (Reinikka & Svensson, 2004) as the centrally allocated resources for local development are cornered by the elites. Of course, the emerging pattern of the development of states is largely influenced by the rent-seeking structure that forms the basis of their creation. Though the military had left since 1999, there seems to be a carry-over of the military structure as observed by Phillips (1991). The incomplete decentralisation that was birthed under the military system has now become a major problem for the states under the democratic government. The states depend mostly on hand-outs from the federal government mainly because the federal government funds come largely from resource rents. The cheap sources of federal revenues make it difficult for the federal government to complete the decentralisation of the federation. Furthermore, the incentive behind the creation of states and local governments in Nigeria generates a chain effect by making the states and local government areas mere appendages of the federal government. The funds that they get through transfers from the federal government are frittered away through corruption and wastage, thereby failing to put in place structures that are relevant to their survival. This has culminated in the present situation of poor own revenue effort that characterised the subnational economies.

3.2 Intergovernmental transfers and own revenue mobilisation at the subnational level in Nigeria

Before 1966, Nigeria had a robust federal system that encouraged interregional competition that enabled some modest development. A regional system of government that recognised differences in the economic resources and structures of the constituent units of the federation was in place until six years after independence. With Decree No. 1 of 1966 announcing the proscription of the constitution and vesting the power to make laws for and running of the federation in the Supreme Military Council (SMC), and Decree No. 2 of 1966 through which the abolition of federalism was enforced, the journey on the road to

[46] Bird and Smart (2002) caution against the use of a measure of fiscal effort in allocation formula. See the article for a detailed discussion. Until 2010, revenue efforts of state governments were not published in Nigeria. Currently, there is no publicly available data on internal revenues of the 774 local government areas.

centralisation was embarked upon.[47] The ripple effect of the decrees, though the suspension of federalism was later reversed with Decree No. 9 of 1966, is yet to abate. The federal system remains unitary even after the demise of the military regime.

In a healthy federal system of government, devolution of economic powers is sacrosanct. Subnational governments can use the resources at their disposal to generate funds to run their governments. This is not the case for Nigeria. Many of the states in Nigeria are tied to the apron's string of the federal "donor" as dependent on the intergovernmental transfers is in the range of 75 percent to 95 percent of their total revenues in a fiscal year as shown in Table III.1 and Figure III.1 (p. 54). Own revenues as a share of gross transfers range between 15 percent to 22 percent. The total tax income of the subnational governments is a small fraction of the federation's gross domestic product (GDP) as observed by Bahl and Bird (2008). As shown in Table III.1, both transfers from the federal government and own revenues of subnational governments respond to the political situation. For general election years, 2007 and 2011, own revenues of states nosedived while transfers from the federal government went up.

The military enacted the Nigerian 1999 Constitution. According to *Section 44 (3)* of the 1999 Constitution of Nigeria, ownership of all land economic and natural resources is vested in the Nigerian federal government. The section states that "the entire property in and control or all minerals, mineral oils and natural gas in, under or upon any land in Nigeria or in, under or upon the territorial waters and the Exclusive Economic Zone of Nigeria shall vest in the Government of the Federation…" This limits economic activities of states and revenues they could generate, leading to incomplete fiscal federalism (see Table II.A5 p. 41) and makes subnational governments mere appendages of the central government in Nigeria. Besides, for taxes that fall under the jurisdictions of both the federal and state governments such as PAYE (PIT), Capital Gain Tax, and Stamp Duties, the power to legislate remains that of the federal government, while the administration of the taxes is shared with states (Phillips, 1997). Based on the horizontal revenue-sharing formula in place, some states in the country are better off in terms of transfers from the federal government despite contributing too little to the federation account.[48]

Sales Tax, a significant source of revenue, was initially under the control of the state governments. It had to be applied on commodity sales in their jurisdictions to raise tax revenues. But, under the military government in January 1994, the Value Added Tax (VAT) was introduced. The states were made to surrender their powers over the Sales Tax to the federal government. The consequence of this is that the federal government

[47] See LeVan, A. C. (2015) for discussion on dictatorship and development in Nigeria.
[48] The federation account is a "Distributable Pool Account" that houses all the federal government incomes that will be ultimately shared by all the three tiers of government.

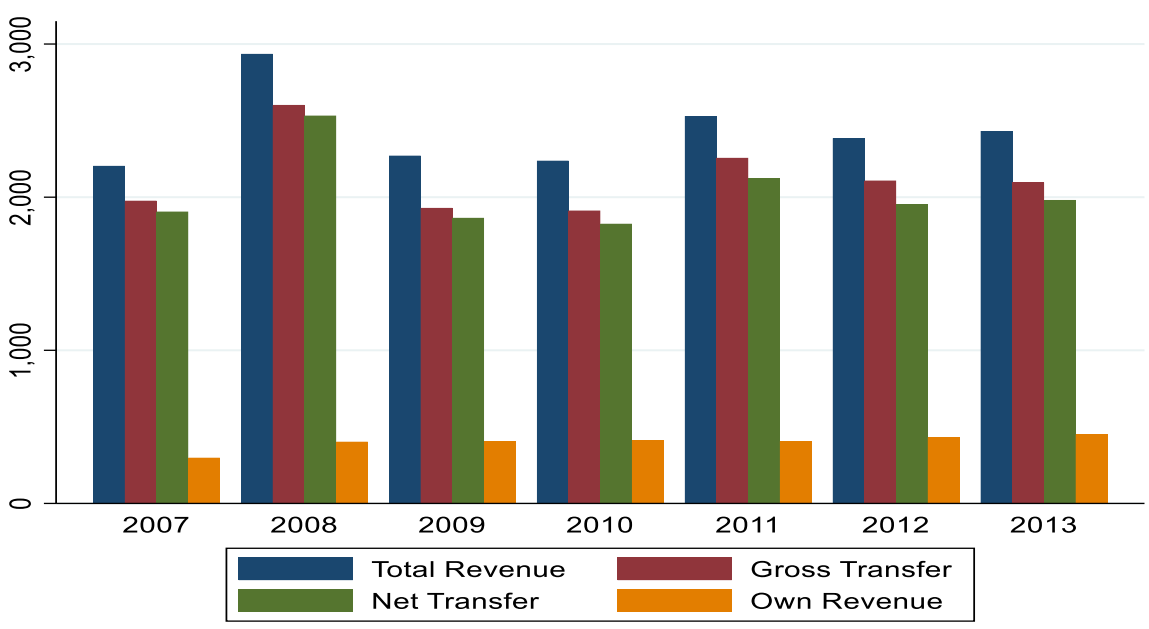
makes states to depend on a share of the VAT revenues.[49] The current vertical sharing arrangement of VAT revenues is 15 percent, 50 percent, and 35 percent for the federal government, state governments, and local governments, respectively. The incentive built into the revenue allocation formula could be a significant determinant in the drive for subnational governments to generate own revenues to fund their programs (Bird & Smart, 2002). This appears to be the case for Nigeria.

Table III.1: Revenues and transfers to states (billions of *naira*), 2007 - 2013

Transfer/Revenue	Fiscal Year						
	2007	2008	2009	2010	2011	2012	2013
Total Revenue	2,204.45	2,935.66	2,271.03	2,238.14	2,529.37	2,384.75	2,432.07
Gross Transfer	1,976.81	2,602.36	1,930.00	1,912.59	2,256.78	2,108.41	2,095.63
Net Transfer	1,905.95	2,532.80	1,865.05	1,826.49	2,123.16	1,953.39	1,981.65
Own Revenue	298.50	402.87	405.98	411.65	406.21	431.36	450.41
OR as % of Net Transfer	15.66	15.91	21.77	22.54	19.13	22.08	22.73
OR as % of Gross Transfer	15.10	15.48	21.04	21.52	18.00	20.46	21.49
OR as % of Total Revenue	13.54	13.72	17.88	18.39	16.06	18.09	18.52

Notes: Total revenue is the sum of net transfer and reported own revenue (OR) for all states in each year. OR is expressed as a percentage of net transfer, gross transfer, and total revenue. Source: Author's computation.

Figure III.1: A bar chart displaying the average real total revenue, gross transfer, net transfer and own revenue of states by year (billions of *naira*), 2007 - 2013



Source: Author's computation.

[49] Though Sales Tax and VAT are not the same, the states were made to stop the imposition of sales tax for a share of federally collected revenues from VAT. Note also that states do not collect VAT.

With the extant horizontal sharing formula (Chapter Two, Table II.2 p.17), the states where fewer economic activities are taking place have a share of the VAT revenues that is almost the same with states where economic activities are substantially large. This happens because equality, population, and landmass largely determine transfers to states. The derivation principle has started to receive attention since 2002.[50] This reflects in the revenue profiles of states in the South-South region where the hydrocarbon economy of Nigeria is located (Figure III.2). The effect of the derivation principle is rather insignificant in terms of motivation for own revenues by subnational governments in Nigeria. The states are still generally less active economically and depend on allocations from the federal government. According to Musgrave (1999 p. 164), "there is ... the principle that spending jurisdictions should be responsible for their finance. This follows as a matter of efficiency in program choice and as a matter of equity, interpersonal as well as interjurisdictional." The violation of this principle engenders moral hazard and tax exporting as in the Nigerian case.

Figure III.2: A bar chart displaying the average real own revenue, net transfer, gross transfer, and total revenue of states by region (billions of *naira*), 2007 - 2013

Notes: The states in the South-South region are mainly oil-producing. One of the states in the South-West and two in the South-East regions belong to the oil-producing states. While North-West comprises of seven states, South-East has five states. All other regions have six states. Source: Author's computation.

[50] This follows the Supreme Court's ruling in respect of revenues derived from sales of mineral resources which are in some states of the federation.

Table III.2: Registered Taxpayers in Nigeria, 2016

Type of Tax	Number of registered taxpayers	Number of active taxpayers	Percent active (percentage of total)
Personal income tax	716,057	14,823	1.95
Company income tax	1,003,010	56,329	5.62
Value added tax	1,505,831	77,082	5.12

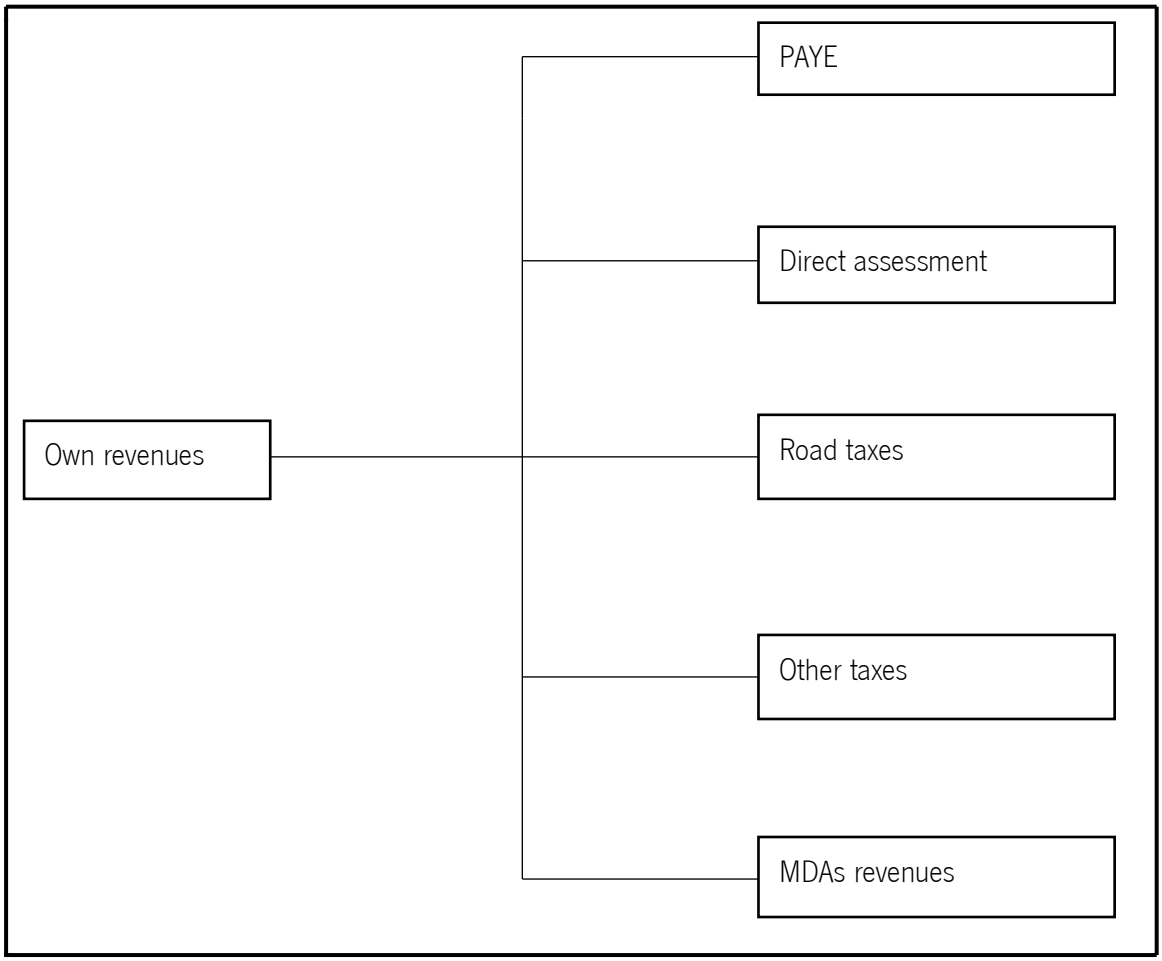
Note: Data collected by the International Survey on Revenue Administration (ISORA). Source: IMF, 2018.

Nigeria has one of the lowest revenue-to-GDP ratios among its peers; its 5.3 percent of GDP in revenues for 2016 is below the sample average of 22 percent of GDP for its peers (IMF, 2018). The non-oil income tax is insignificant. This is borne out of the effect of the nation's significant oil resources on the federal government revenues. The oil resources create a cheap source of income for the federal government on which the entire federation relies. The information in Table III.2 above depicts the poor administration of taxes that fall under the jurisdiction of the federal government of Nigeria. It appears subnational governments mirror the federal government in their efforts for revenue mobilisation.

The assigned sources of revenues to states (Table II.A5 p. 41) are reported under five classifications apart from unconditional transfers from the federal government and investment incomes: Pay as You Earn (PAYE) which are deductible from workers' salary at the source, direct assessment for self-employed individuals, road taxes for road users, and other taxes such as Withholding Tax, Capital Gain Tax and Stamp Duties, and revenues from services by ministries, departments and agencies (MDAs) of state governments (see Figure III.3). According to data from the Joint Tax Board (JTB), of the 10 million registered personal income taxpayers (PIT) for all states in Nigeria including the FCT, 46 percent are in the tax net of Lagos State alone (IMF, 2018). The registered taxpayers are far below the nation's workforce of 77 million in 2015. This implies that only about 13 percent of the labour force are taxpayers. However, many of the states are civil service states where there are few private establishments. The inability to bring workers in formal employment in their states into their tax nets points to the issue of weak tax administration bedevilling states and the effects of the incentive scheme built into the unconditional intergovernmental transfers in Nigeria. The subnational governments are plagued by lack of capacity for tax collection, poor tax policies, corruption in tax administration, and limited tax bases (Joseph-Raji, 2015). The challenges are made worse by a high degree of informality in all the subnational economies.

Due to political factors surrounding the creation of states, states pay less attention to developing their sources of internal revenues. Apart from the poor incentive scheme in the horizontal allocation formula, the existing constitution is rather market-perverting instead of being market-preserving. The constitution does not ensure a healthy competition among subnational governments of the Nigerian state but makes them dependent on the federal government for survival. States compete on how to increase their shares of the "national cake" rather than working on expanding the cake. This conforms with the view that "it is a universal feature of human nature to desire more of something when someone else pays for it than when you pay for it yourself (Wagner, 2012 p. 5)." Indeed, there is a real moral hazard issue in revenue sharing among subnational governments in Nigeria. The subnational governments are indulged in weak revenue-generating efforts. Thus, they face a soft budget constraint with all the negative implications for the national economy.

Figure III.3: Classification of own revenue sources of state governments in Nigeria



Notes: PAYE means Pay as You Earn. It is a tax on personal income deductible from salary at the source. MDAs refers to ministries, departments and agencies of state governments. Source: Author's compilation.

4. Methodology

4.1 The basic empirical model

This study follows the empirical model of Caldeira and Rota-Graziosi (2014) with a similar model employed in Masaki (2018) to empirically test the relationship between intergovernmental transfers and own revenues of subnational governments in Nigeria. These studies attempt to answer the same research question with respect to the impact of intergovernmental transfers on own revenues of subnational governments. Two, these studies focus on sub-Saharan African countries, Benin (Caldeira & Rota-Graziozi, 2014) and Tanzania (Masaki, 2018), which have similar economic structure as they are primary product producers as Nigeria. Our study differs from these articles with respect to samples for the research. This study focuses on the second-level administrative units, states in Nigeria as Nigeria is a federal state with a three-tier federal government structure by the constitution. These other African countries are nominally unitary states with decentralised administration.

$$Own\ revenue_{i,t} = \beta Transfer_{i,t} + \gamma \mathbf{X}_{i,t} + \alpha + \xi_{i,t} \quad (1)$$

Equation (1) relates own revenues per capita to change in intergovernmental transfers per capita and a set of covariates to identify the effect of intergovernmental transfers on own revenue effort where i and t index state i and year t, respectively. *Own revenue* represents the real revenues from taxes and fees raised by a subnational government per capita local currency (*naira*) log transformed. At the same time, *Transfer* is the real intergovernmental transfers due to a state per capita local currency log transformed. The $\mathbf{X}_{i,t}$ represents several covariates (*Population density*, *Election year*, *Agricultural loan*, *Children population*, *Luminosity*, *Fragmentation*, *Educationally developed state*, *Distance to FCT*) which help to lessen the effect of omitted variable bias in the model. β and γ are vectors of parameters to be estimated; $\xi_{i,t}$ is the error term while α is the homogenous intercept term for each state i when the model is estimated using pooled ordinary least squares (OLS).

Estimating equation (1) with OLS or any other similar estimator without taking into consideration the potential reverse causality or endogeneity issue arising from the impact of intergovernmental transfers on own revenues may generate biased estimates. This is because the flow, as well as the volume of intergovernmental transfers, is likely to be endogenous to own revenues of the subnational governments. A dynamic model in the form of system generalised method of moments (SGMM), therefore, may be more

appropriate in addressing the issue. To address the issue of endogeneity, a second model which is a modified version of the equation (1) is stated as follows:

$$Own\ revenue_{i,t} = \beta Transfer_{i,t} + \varphi Transfer_{i,t-1} + \rho Own\ revenue_{i,t-1} + \gamma \mathbf{X}_{i,t} + \alpha_i + \xi_{i,t} \quad (2)$$
$$i = 1, \dots\dots, N, \quad t = 1, \dots\dots, T$$

where i and t are as described in equation (1). The parameters of interest to be estimated in equation (2) are β, φ, ρ and γ. α_i is the individual effect of state i, while ξ_{it} is the error term. Equation (2) is vital for this study since own revenues may be persistence over the years. The own revenues of any subnational government may be dependent on the past level of both own revenues and intergovernmental transfers. More so, own revenue effort is factored into the horizontal revenue sharing.[51] Thus, equation (2) helps to capture the effects of the past own revenues and intergovernmental transfers by including not just the lagged value of own revenues but also the contemporaneous and lagged values of intergovernmental transfers. It is therefore required that the sum of β and φ should be greater than zero for transfers to crowd in own revenues. In view of the foregoing, it may be more appropriate to use a dynamic model.

Economic theory predicts that subnational governments will reduce efforts in generating own revenues in the face of a constant and steady flow of transfers from the central government. In order to estimates the relationship in the case of states in Nigeria, this study employs some covariates in the models which are defined below. *Population density* is the number of people per square kilometre in a state. It is log-transformed. This is expected to significantly influence own revenues of subnational governments in Nigeria (Mogues & Benin, 2012). However, the expected sign of the coefficient of this variable is not clear as the own revenue generation depends mainly on the efficiency of states in tax administration. *Election year* is a dummy variable that takes 1 for the election year, and 0 otherwise. Politics influences decisions in tax administration at the subnational level (Khemani, 2015).[52] Executives in power have used tax policies to sway decisions of voters during the period of election. It is expected that the coefficient associated with this variable will be negative. Population under 15 years of age is *Children population* in each state.[53] A large population of children in a state presents both threat and opportunity. It represents an opportunity where

[51] This may be valid in principle than in practice. Local government areas are allocated transfers without data on own revenues. By and large, this does not invalidate the use of the dynamic model as other considerations are valid. See notes under Table II.2 p. 17.

[52] Caldeira and Rota-Graziosa (2014) used partisan affiliation, while Masaki (2018) used political support as indicated by share of presidential votes for the incumbent. We do not think partisan affiliation will affect own revenues in the Nigerian case. Given the observed trend of our data and the observation of Bahl and Bird (2008, p. 10), we consider the use of election year as a credible factor in own revenue generation. See Table III.1.

[53] Mogues and Benin (2012) used population size. The choice of a set subset of the population is based on the median age of 18 in Nigeria.

the state can mobilise resources to harness their talents, but a threat where the state is unable to meet their needs for personal development. The burden of meeting the needs of the young population in order to channel their talents to productive use does require a state to be able to raise substantial tax revenues. The expected sign of the coefficient associated with this variable is not definite.

In order to estimate the effect of the sizes of subnational economies on own revenues, the log-transformed *Agricultural loan* per capita of each state is included as an independent variable in the model. Many subnational economies in Nigeria are predominantly agrarian. The value of loans channels into the agricultural sector is assumed a significant determinant of the sizes of subnational economies. The value of loan divided by the population of each state gives the agricultural loan per capita. This can also significantly influence how much is raised in own revenues by subnational governments. The expected sign of the coefficient of this variable is positive. Analogous to the agricultural loan per capita in measuring the subnational economies is the brightness of visible lights from space at night which is termed *Luminosity*. The night lights can help to measure income, which is a measure of the gross domestic products (GDP) of economies, especially in economies characterised by a high level of informality like the Nigerian subnational economies (Henderson, Storeygard, & Weil, 2011, 2012). The expected sign of the coefficient associated with this variable is positive as it is expected that the sizes of the economies will correlate with their incomes.

Under each state is the third level of administration. These are known as local government areas in Nigeria. This is captured with the variable tagged *Fragmentation,* and it is log transformed. The local government areas are not established on any economic justification but political considerations.[54] The number in each state influences political matters, including the presence of the federal government in each state and the total transfers to each state because they are statutorily entitled to a share of the federal income. The expected sign of the coefficient associated with this variable is negative because it is assumed that states with more local government areas will lower their efforts in pursuing own revenue mobilisation. The level of literacy matters to states' economies. There is no time series measure for literacy at the subnational level for the entire period that this study covers. However, this study uses a dichotomous variable based on the classification of states by a Nigerian government parastatal. Some states are regarded as educationally developed states in Nigeria, which are in the minority while the other states are classified as educationally less developed states (*ELDS*).[55] The *Educationally developed states* are coded 1, otherwise for the *ELDS*. Literacy level signifies the level of human capital development in a state. States with a high level of human

[54] See section 3 of this chapter for the detailed discussion of the justification for the inclusion of this variable. Besides, Mourão (2012) used *freguesias*, subunits of municipalities in Portugal.

[55] The ELDS are Adamawa, Bauchi, Bayelsa, Benue, Borno, Cross Rivers, Ebonyi, Gombe, Jigawa, Kaduna, Kano, Kastina, Kebbi, Kogi, Kwara, Nassarawa, Niger, Plateau, Rivers, Sokoto, Taraba, Yobe, and Zamfara. They are 23 in number out of the 36 autonomous states.

capital development are expected to have higher own revenues than states that are categorised as *ELDS*. Thus, a positive sign is expected for the coefficient of this variable. *Distance to FCT*, the administrative capital of Nigeria is another variable in this study. States that are closer to the central administrative capital are expected to receive higher transfers from the central government (Gisselquist, Leiderer & Nino-Zarazú, 2016). However, the expected sign of the coefficient associated with the log-transformed variable is not clear.[56]

4.2 Data, specification tests, and estimation strategy

The data for this study is longitudinal data with cross-sectional and time dimensions on the second-level administrative units, states in Nigeria. This study focuses on the states because information on own revenues of the local government areas is not available. The data spans a period of seven years, from the year 2007 to the year 2013. The shortness in the panel is due to the need to use the DMPS-OLS nightlights data which is not available after 2013 to proxy sizes of subnational economies and the non-availability of own revenue data for states before 2007. Besides, the Nigerian economy has slowed down since 2014, which can confound the relationship between federal transfers and own revenues. The monetary variables are obtained from government offices in Nigeria in the nominal term, and they are denominated in the Nigerian currency, *naira*. All monetary variables are adjusted for the change in the time value of money using the composite consumer price index (CCPI) to obtain real values.

The data on transfers is a monthly data in its original form because intergovernmental transfers are made monthly from incomes of the federal government from the previous month. On the other hand, own revenue data is released quarterly. Some states do not make their own revenue data available quarterly but only at the end of the year. Thus, the data is aggregated yearly for both transfers and own revenues over the year. All other data, including the dichotomous variables, distance to FCT and fragmentation, is constructed annually. The night lights data, *Luminosity* is the annual average visible lights from version 4 DMSP-OLS night-time lights series. The information is obtained using ArcMap in ArcGIS to process the DMSP-OLS data archived on the website of the National Oceanic and Atmospheric Administration (NOAA). The data is available from the year 1992 to the year 2013. A subset of the observational time series data is used in this study.

[56] More information on fragmentation and distance to FCT is provided later in this study as they are used as the instruments in both instrumental variables and system General Method of Moments estimators.

Some specification and diagnostic tests are conducted to check for issues that may impair the econometric estimation of the study. Correlation analysis of the variables reveals that, among the independent variables, *Fragmentation* correlates with *Children population*. The coefficient is in the region of 0.66. All other variables have lower correlation coefficients. Also, a test was conducted to determine the presence of autocorrelation in the data using the Wooldridge test for autocorrelation in panel data (Drucker, 2003; Wooldridge, 2010), the test confirms the presence of autocorrelation by rejecting the null hypothesis of no serial autocorrelation with an F statistic of 16.38 at 1 percent level of significance. Also, two tests are conducted to determine the presence of heteroskedasticity in the data. The Breusch-Pagan test (Breusch & Pagan, 1979) for heteroskedasticity with a null hypothesis that the error variances are all equal indicates that the null of homoskedasticity cannot be rejected with a Chi-squared of 2.08 and a p-value of 0.14. The size of the Chi-squared value does point to the absence of the problem of heteroskedasticity. However, this test has the shortcomings of not detecting heteroskedasticity when the errors are not normally distributed, and when the variances are not linear. In view of the limitations, this study exploits White's test for heteroskedasticity (White, 1980), which is robust to other forms of heteroskedasticity. The result of the test indicates that the null of homoskedasticity is rejected with a chi-square of 83.41 at 1 percent level of significance. Both autocorrelation and heteroskedasticity have implications for standard errors and efficiency of econometric estimates (Wooldridge, 2013) of this study. The regressions are clustered over the states in order to address the problems. The clustered robust standard error relaxes the assumption of no correlation in the errors by allowing correlations within clusters but not between clusters.

Table III.3 (p. 63) gives the descriptive statistics of the data for regressions and displays the overall, between as well as within variability of the data. Though data varies widely overall, the data varies widely between in comparative term with within variance of the data. Also, Tables III.A1 and III.A2 in the Appendix show the variability of the data for the last year in the series and the first year, 2007. Overall refers to the statistics computed for all the states in the dataset; in estimating the overall statistics, observations, N (252) are used. Between statistics explain the difference in states in the dataset; information about n (36) is used in the computation of between statistics which show the variance from state to state. Within statistics are computed for each state in the dataset. It gives information about variation within a state only. The within variance may be negative because it is a deviation from each state's average. This is noticeable from the minimum observation for some variables displayed in Table III.3. The within minimum statistics for *Own revenue* and others are negative. For the time-invariant variables, the standard deviation is 0, as shown in Table III.3 for *Fragmentation* and *Distance to FCT*. All these have implications for the efficiency of estimates and estimation strategies that can be exploited in this study. In other words, methods that exploit more of

within variance cannot be fully implemented for all the data (Verbeek, 2017; Baltagi, 2013). Notwithstanding the limitation imposed by the data structure, the following estimation strategies: pooled ordinary least squares (OLS) estimator, fixed effects (FE) estimator, random effects (RE) estimator, two-stage least squares (2SLS) estimator, and SGMM estimator are used in this study.

Table III.3: Descriptive statistics, 2007-2013

Variable		Mean	Std. Dev.	Min	Max
Own revenue	Overall	2,054.47	2,920.55	120.27	19,492.75
	Between		2,868.93	425.80	16,451.97
	Within		703.97	-750.39	6,568.20
Transfer	Overall	14,600.91	12,870.18	5,392.26	101,232.70
	Between		12,346.29	5,882.30	66,096.18
	Within		4,105.42	369.08	49,737.48
Population density	Overall	338.45	464.57	40.77	3,008.09
	Between		468.80	44.55	2,738.34
	Within		36.19	82.70	608.19
Agricultural loan	Overall	50.47	45.91	0.00	276.41
	Between		32.21	11.83	126.35
	Within		33.08	-51.55	239.72
Children population	Overall	1,776.98	787.51	712.87	4,792.78
	Between		787.34	778.98	4,350.49
	Within		122.80	1,358.35	2,219.28
Luminosity	Overall	2.83	4.72	0.03	21.35
	Between		4.71	0.08	17.97
	Within		0.81	-0.96	7.26
Fragmentation	Overall	21.33	7.07	8.00	44.00
	Between		7.15	8.00	44.00
	Within		0.00	21.33	21.33
Distance to FCT	Overall	522.78	197.96	156.00	957.00
	Between		200.37	156.00	957.00
	Within		0.00	522.78	522.78
Election year	Overall	0.33		0	1
	Between			0.29	0.57
	Within			-0.25	1.04
Educationally developed state	Overall	0.36		0	1
	Between			0	1
	Within			0.36	0.36

Notes: Data is sourced from the Central Bank of Nigeria (CBN), Joint Tax Board (JTB), National Bureau of Statistics (NBS), NOAA's National Centre for Environmental Information, and Office of the Accountant General of the Federation (OAGF). N = 252, the number of states is 36, and T = 7. Own revenue, transfer and agricultural loan are in per capita term. Children population is in '000. Distance to FCT is the distance to the Federal Capital Territory from a state. All dummy variables are generated by the author based on public information. Source: Author's computation.

4.2.1 OLS, FE, and RE

The pooled OLS results from the application of the OLS procedure in the estimation of equation (1). This estimation procedure, which exploits a weighted average of within and between effects, rests on the assumptions of strict exogeneity of regressors and homogeneity of intercepts for the fulfilment of unbiasedness and consistency. The strict exogeneity requires that the composite error is not correlated with regressors. The violation of this condition leads to autocorrelation between composite error and the regressors, which invalidate standard errors and test statistics. Besides, OLS assumption of homogeneity of the intercept for states in our sample may not be met because of a myriad of factors that are state-specific that drive own revenues. This creates a potential bias problem. Also, the violation of both exogeneity and homogeneity conditions will lead to autocorrelation between composite errors at different time periods. The robust standard error clustered over the states can be computed to deal with the problem of autocorrelation of the composite errors. This corrects for the biasedness in standard error and test statistics.

The FE estimator improves over a critical challenge of the pooled OLS by allowing different intercepts. The cross-sectional units, states, in our sample, are not the same but similar. Thus, allowing different intercepts for different states bring our statistical analysis close to reality. FE makes use of the variation within each state, which helps to explain the observed changes from one period to another. The within variation also captures the time-invariant individual state-specific effects of states. Under the exogeneity assumption of the FE estimator, it is required that there should be no covariance between the within-entity error term, *epsilon_it* and regressors. However, under the FE estimator, the individual state-specific error and regressors are sometimes correlated. When this happens, regressors with little within-variance are automatically dropped from the FE estimator. This is one of the significant drawbacks of the FE estimator. The within transformation of variables under the FE estimator eliminates all time-invariant variables. Though the time-invariant variables are subsumed in state-specific effects, the landmass of a state which is a significant factor in its production of goods and services including revenue generation cannot be included as a variable under the estimator.

Where we have time-invariant variables, the RE estimator comes in handy compared with the FE estimator. The transformation of variables employs in RE does not eliminate the time-invariant variables. RE is more efficient than both pooled OLS and FE because it uses weighted information from within and between effects. Unlike pooled OLS, RE uses a matrix weighted average of within and between effects (Baltagi, 2013). The RE estimator requires that regressors and the composite error are not correlated. The composite error is composed of state-specific error which is the same at all time periods, and the usual random error term.

The presence of the state-specific error in each time period causes serial correlation across time. This problem of autocorrelation in the composite error invalidates the estimates of RE using OLS. The generalised least squares (GLS) estimator comes in handy to address the challenge of autocorrelation of the composite error to obtain efficient estimates of standard errors. However, the efficiency of RE is hampered by the requirement that the composite error should be uncorrelated with regressors which may be hard to satisfy.

Where T is large, the estimates of both FE and RE are similar. In such a case, the choice of estimator becomes a matter of choice and/or the reality of the data generating process (DGP). However, where T is short, the difference between the two estimators can be very large. The theoretical requirements of each estimator, the available data, and the purpose of the empirical analysis may determine the choice of estimator. Notwithstanding, a choice of estimator between RE and FE can be determined with the aid of the Hausman test (Hausman, 1978). The test can be computed after the estimation of both RE and FE. It is distributed as a Chi-squared with the null hypothesis that the individual state-specific error is not correlated with the regressors. This implies that RE is only efficient under the null hypothesis, but FE is efficient under both the null and alternative hypotheses. The major challenge in the practical application of the test is that the covariance matrix may not be positive definite. This invalidates the test. For pooled OLS and RE, the Breusch-Pagan Lagrangian Multiplier test for random effects (Breusch & Pagan, 1980) can be applied to test for unbiasedness of RE. The null hypothesis tests for a panel effect. The rejection of the null hypothesis implies that there is no panel effect. Under this situation, OLS is an efficient estimator. It should be noted that the R-squared from the three estimators are not comparable.

3.2.2 Endogeneity, 2SLS, and SGMM

There is a reason to believe that coefficient estimates of equation (2) using any of the estimators described in the previous section are biased. Many subnational governments lack the capacity to collect own revenues efficiently. The flow of transfers from the federal government may be instrumental to the development of the capacity for own revenue collection at subnational levels (Troland, 2016; Masaki, 2018). In this case, there is a reason to suspect simultaneity and reverse causality between own revenues and transfers from the central government leading to the problem of endogeneity. In other words, a correlation between the regressors and the error term is suspected. Thus, OLS is inconsistent in estimating the coefficients of equation (1). Instrumental variables (IV)/two-stage least squares (2SLS) model may be more appropriate in estimating equation (1).

An IV/2SLS model requires at least a variable that satisfies two critical conditions: exogeneity and relevance. Exogeneity requires that the IV variable is not correlated with the residual error, while the relevance condition requires the variable to be correlated with the endogenous regressor. Without satisfying these conditions, an IV model breaks down. This can be tested using a battery of tests such as overidentification test, and underidentification test, among others. In this study, it is reasoned that both *Fragmentation*[57] and *Distance to FCT* in level satisfy conditions for the validity of instruments in the IV model. This is based on the economics of revenue sharing in Nigeria and the empirical finding of established scholars. Gisselquist *et al.*, (2016) and Masaki (2018) have established that distance from the national capital is an exogenous variable that influences intergovernmental transfers from the central government to subnational units. Also, the number of local government areas or political units[58] in a state can influence the intergovernmental transfers to the state, but not the amount that can be raised in own revenues. This emanates from the view that politicians allocate resources tactically for political gains (Johansson, 2003; Veiga 2012; Kauder, Potrafke & Reischmann, 2016). Electoral consideration can bring the issue of fragmentation into sharing of intergovernmental transfers.

On the other hand, economic behaviour tends to be persistent over time. The likelihood that own revenue mobilisation in one period may be dependent on past own revenues and transfers from the central government to a subnational unit may make the panel data dynamic model more suitable to address the issue under study. In the presence of lagged dependent variable among regressors, there is a loss of strict exogenous assumption of regressors. In this situation, neither FE nor RE is a consistent estimator for a panel data model, especially where N is large, and T is short.[59] Understandably, both RE and FE will not be useful for handling endogeneity and persistence. This arises because of the inclusion of a lagged dependent variable among regressors which generates two challenges. One, the lagged dependent variable is weakly exogenous, and it correlates with state-specific error and the lagged random error; and, the persistence effect of the initial condition of the dependent variable in a short panel. One of the methods to handle these challenges is the generalised method of moments (GMM) which was first introduced by Arellano and Bond (1991). They exploit the orthogonality condition between the lagged dependent variable and the random error to generate instruments to address the problem of autocorrelation. Blundell and Bond (1998) extend

[57] Unlike developed countries where the expansion of municipalities is used to promote development and increase revenues (Hatfield & Kosec, 2013 and Baskaran, Field & Schnellenbach, 2016), Nigerian states are not free to increase the number of their municipalities. The current local government areas in each state in Nigeria were created under the military to increase transfers to some states and entrench itself in power. In developing countries, political considerations trump efficiency criterion in decentralisation decisions (Bardhan, 2002). See also footnotes 40 and 42, and section 3 of Chapter Three.

[58] Political units such as electoral wards, senatorial districts, and federal representatives' districts are deemed to be valid instruments in respect of the issue here given the strategic consideration of politicians in the allocation of public funds. However, this study only uses the number of local government areas.

[59] The inclusion of a lagged dependent variable among the regressors transforms the equation (2) to a dynamic model. The presence of a lagged dependent variable violates the exogeneity assumption of the regressors. Kennedy (2008) suggests the use of GMM where T is less than 20 when modelling dynamics.

previous studies by Arellano and Bond (1991) and Arellano and Bover (1995). They exploit imposition of restrictions on the distribution of the initial values of the dependent variable, which allow the use of lagged differences of the dependent variable as instruments in the level equations in SGMM. The SGMM rest on the absence of autocorrelation, at least second-order autocorrelation (AR2). Autocorrelation of order 1 (AR1) is expected because of the correlation of the lagged dependent variable with the state-specific error. This study implements the two-step GMM estimator with finite sample correction in standard errors (Windmeijer, 2005). The instruments are handled according to Roadman (2009a, 2009b).

5. Results

5.1 Empirical results

The results of the econometric estimation are presented in this section. The results are in Table III.4 below (p. 68). Based on the strength of arguments presented in Section 3.2.2, the analysis will focus primarily on the results from the IV/2SLS and SGMM models. Nevertheless, the results of the OLS and static panel data models in columns 1-5 are briefly presented. One thing that stands out from the results in Table III.4 is that the coefficient of *Transfer* is positive, but it is not statistically significant for OLS, and the static panel model estimators in columns 1-5. This may be due to the issues of endogeneity and reverse causality discussed in the previous section. Results in columns 1-3 are compared to determine the most consistent and efficient of the estimators. The results of the BP LM test (with the null hypothesis that there is no panel effect) to compare the efficiency and consistency of OLS and RE does confirm a panel effect. Thus, the result indicates that the RE model is more efficient with a Chi-squared statistic of 364.30 at 1 percent level of significance. Under RE model in column 3, *Population density* and *Luminosity* are positively correlated with *Own revenue*, while *Election year* is negatively correlated with *Own revenue*.

Table III.4: The impact of net intergovernmental transfers on own revenue generation of subnational governments in Nigeria

Variable	OLS	FE	RE	OLS	RE	2SLS	SGMM	SGMM
Log of transfer	0.2246	0.0603	0.1590	0.3475	0.1970	-0.6631*	0.3386	0.5047
	(0.2410)	(0.1430)	(0.1312)	(0.2095)	(0.1370)	(0.3729)	(0.4910)	(0.3313)
Log of transfer (t-1)							-0.3495**	-0.4365**
							(0.1548)	(0.1966)
Log of own revenue (t-1)							0.5494**	0.8439***
							(0.2687)	(0.1535)
Log of population density	0.1896*	1.8033*	0.3544***	-0.0292	0.1358	-0.1229	0.2035	0.0426
	(0.1023)	(0.9842)	(0.1333)	(0.1529)	(0.1803)	(0.1870)	(0.4698)	(0.3047)
Election year	-0.1834***	-0.1190**	-0.1410***	-0.1860***	-0.1333***	-0.1327**	-0.1585*	-0.1596*
	(0.0610)	(0.0457)	(0.0487)	(0.0605)	(0.0474)	(0.0653)	(0.0857)	(0.0888)
Log of agricultural loan	0.0800	0.0509*	0.0442	0.1272*	0.0494*	0.0404	0.0498	0.0134
	(0.0711)	(0.0274)	(0.0286)	(0.0636)	(0.0282)	(0.0900)	(0.1225)	(0.0861)
Children population	-0.0004	-0.0032	0.0003	0.0038	0.0035**	-0.0011	-0.0010	-0.0004
	(0.0017)	(0.0052)	(0.0012)	(0.0023)	(0.0018)	(0.0027)	(0.0034)	(0.0022)
Luminosity	0.0956**	-0.0018	0.0534**	0.0721**	0.0443*	0.1660***	0.0228	0.0180
	(0.0374)	(0.0264)	(0.0211)	(0.0338)	(0.0233)	(0.0384)	(0.0255)	(0.0357)
Log of fragmentation				-0.9021**	-1.0235***	-0.6319		
				(0.3991)	(0.3913)	(0.5188)		
Edu. developed state				0.5941**	0.4964*	0.4755*		
				(0.2349)	(0.2834)	(0.2581)		
Log of distance to FCT				-0.0609	0.0283	-0.0120		
				(0.1233)	(0.1213)	(0.1577)		
R^2	0.52	0.12	0.52	0.60	0.63	0.44		
Rho		0.94	0.76		0.72			
RMSE	0.61	0.29	0.32	0.56	0.32	0.65		
BP LM stat			364.30***		312.87***			
Hausman test		15.24**						
KP *rk* LM stat (p value)						0.04		
AR1 (p value)							0.09	0.03
AR2 (p value)							0.40	0.34
Hansen stat (p value)						0.55	0.16	0.20
No of instruments						11	32	33
Observation	250	250	250	250	250	250	215	215

Significance levels: *: 10%, **: 5%, ***: 1%. Clustered robust standard errors at the state level are in parentheses. The dependent variable is own revenue per capita while the transfer is the net transfer per capita. Edu. developed state refers to *Educationally developed state*. RMSE means Root Mean Squared Error. Results in columns 1-6 are estimates of equation (1) using various estimators while the results for equation (2) are shown in columns 7-8. The instruments for the 2SLS in column 6 are *Fragmentation* and *Distance to FCT* in level and the Kleibergen-Paap Wald *rk* F statistic for weak identification test is 15.48. For column 7, the IV-style instrument is *Distance to FCT* in level while *Fragmentation* and *Distance to FCT* in level are used as IV-style instruments in the result displayed in column 8. BP LM stat refers to the Breusch-Pagan Langragian Multiplier statistic. KP *rk* LM stat refers to Kleibergen-Paap *rk* Langragian Multiplier statistic (p-value). The number of units (n) is 36 and they are the 36 autonomous second-level administrative units (states) in Nigeria. AR1 and AR2 are Arellano-Bond test for AR1 and AR2 respectively in first difference. Source: Author's computation.

The Hausman test indicates that the RE and FE estimators are very different by rejecting the null hypothesis that the state-specific component of the error term is not correlated with the regressors. This implies that FE is more appropriate and consistent with a Chi-squared statistic of 15.24 at 5 percent level of significance. Notwithstanding this fact, the RE estimator is implemented because of the number of time-invariant variables among the regressors. Besides, our interest is in generalising the results for the entire subnational governments of Nigeria rather than a specific administrative level. Given the above explanation, it is deemed appropriate to add other time-invariant variables in columns 4-5. Again, the null hypothesis of no panel effect is rejected with a BP LM statistic of 312.87 at 1 percent level of significance.

Focusing on the result of the RE estimator in column 5, Table III.4, there will be about 13 percent reduction in own revenue per capita of any state in any *Election year*. Though the *Children population* is statistically significant and positive, it has a marginal effect of about 0.35 percent on the own revenue drive of states. A 1 percent rise in *Luminosity* will lead to an increase in own revenue by about 5 percent in per capita term. In a case of about 1 percent increase in the *Fragmentation* of a state, the own revenue drive of the state will go down by over 1 percent per head. Notwithstanding the cautionary note at the outset of this section, this statistical revelation speaks to the Nigerian situation where a state with more local government areas relies heavily on federal transfers. Being an *Educationally developed state* will contribute positively to own revenues by about 64 percent all thing being equal. Of course, almost all the states that are performing well in term of own revenue mobilisation are southern states that are not in the group of educational less developed states (*ELDS*). The RE model has a good fit with between R-squared of 63 percent; and a smaller RMSE of 0.32 in comparison with OLS. The *Rho* of 0.72 indicates that 72 percent of the variation is due to differences across panels. Also, the Wald statistic shows a good model with a Chi-squared of 117.97 for the rejection of the null hypothesis that the regressors are zero at 1 percent level of significance.

Now, we focus on results from the IV/2SLS and dynamic panel models. From the IV/2SLS model, a 1 percent rise in *Transfer* will lead to a 0.66 percent fall in own revenue per capita. This indicates transfer dependency among the subnational governments in Nigeria. *Election year* is a period of vote buying in many developing countries (Khemani, 2015), including Nigeria, with policies being designed to favour the electorate because of inadequate investment in public services. As such, own revenue mobilisation will see a reduction of about 13 percent in any period of the election. About 18.1 percent rise in own revenue can be attributed to 1 percent change in *Luminosity* of any state while being an *Educationally developed state* will account for 61 percent rise in own revenue per capita. The model has an R-squared of 0.44; this implies the model explains 44 percent of the variation in *Own revenue* per capita. The model has an F statistic of

19.16 at 1 percent level of significance, which indicates that the model is good. The Kleibergen-Paap *rk* Langragian Multiplier statistic for the underidentification test with a Chi-squared of 6.28 and a p-value of 0.04 shows that the excluded instruments are valid and relevant. The model is identified; and, the excluded instruments are correlated with the endogenous regressor. The Kleibergen-Paap *rk* Wald F statistic of 15.48 does confirm that the instruments are not weak based on Staiger and Stock's (1997) rule of thumb that an F statistic above 10 indicates that weak identification is not a problem.[60] In all, the joint null hypothesis that the instruments are valid cannot be rejected. The Hansen J statistic for the overidentification test of all instruments indicates that the excluded instruments are correctly excluded with a Chi-squared of 0.36 and a p-value of 0.55.

The results from the SGMM models in columns 7-8 are similar despite the difference in the IV-style instruments applied.[61] The result in column 7 does confirm the result of the IV/2SLS model in column 6. *Transfer* is not statistically significant, but the coefficient has a positive sign. The lag of *Transfer* is negative and statistically significant. It implies that a year after receiving a 1 percent increase in transfers, the own revenues of subnational governments will fall by about 0.35 percent in per capita term. Since many subnational governments lack the capacity to collect own revenues efficiently, they get carried away with an increase in transfers in the following year that they abandon own revenue mobilisation. This is nothing but a confirmation of the transfer dependency alluded to earlier. The lag of *Own revenue*, the dependent variable is positive and statistically significant. This shows that the own revenue is serially correlated over the period. An *Election year* will see a reduction in the own revenue by 15 percent. The only difference between results in column 7 and 8 is in the magnitude of the parameter estimates of the lag of *Transfer* and *Own revenue* which is attributed to the instruments used in the models. For the model in column 7, the autocorrelation of either order 1 or 2 is not a problem. It has a Hansen statistic p-value of 0.16, the number of instruments used is 32. The model has an F statistic of 9.77 for rejection of the null that a model without regressors fits the data better at 1 percent level of significance. Unlike the model in column 7, the model in column 8 has a problem of autocorrelation of order 1. But, it does not suffer from autocorrelation of order 2 with an AR2 p-value of 0.34 at 5 percent level of significance. Also, it has a Hansen statistic p-value of 0.20. The model used a modest number of instruments at 33. The model has an F statistic of 90.93 for rejection of the null hypothesis that a model with no regressor fits the data better at 1 percent level of significance.

[60] Having identified two problems of autocorrelation and heteroskedasticity in our data, we cannot expect that the error term from our regression will be independent and identically distributed which necessitates the clustering of our regression over the states. This invalidates the Cragg-Donald Wald F statistic reported in ivreg2. Hence, we rely on the Kleibergen-Paap rk Wald F statistic and adopt Staiger and Stock's (1997) rule of thumb.

[61] *Fragmentation* in level and *Fragmentation* and *Distance to FCT* in level are used as instruments for models in columns 7 and 8, respectively. Also, two steps GMM estimation with the robust option in *xtabond* is specified to apply Windmeijer (2005) for the correction of standard errors of the estimator. Also, the GMM instruments are lagged by 1.

5.2 Robustness checks

A set of regressions is estimated to test the robustness of the main regression results from the models. The same data used in the main regression is used for robustness checks except for the data on *Transfer*. The gross transfer is what is due to a state at any time money is shared among levels of government in Nigeria. However, what states ultimately get is the net transfer which has been used in the main regressions in Table III.4. Because subnational governments cannot commit directly to foreign borrowings on their own, states apply for foreign loans with a guarantee from the federal government that creditors will be paid as at when due. This is done to control the propensity of subnational governments to accumulate debts that may lead to a macroeconomic crisis for the nation. So, the federal government deducts due repayments at the source from states' allocations at any time money is shared among levels of government. Sometimes, the deduction may also be in respect of advances or overpayment made to states by the federal government. It may also be in respect of repayment for joint projects or local debts. When these deductions are made, states are credited with their balances which are referred to as the net transfers.

The difference between gross transfers and net transfers could be huge for some states. The potential difference has enormous implications on the behaviour of the executives in power that are responsible for the management of states' finances. One of such possibilities is that where the gross transfer is enormous, it could encourage borrowing for anticipated transfers. And, such behaviour could discourage interest in own revenue mobilisation. In all, the difference between gross transfers and net transfers could have a major impact on own revenue efforts of subnational governments. Thus, it is reasonable to use the gross transfer in place of the net transfer to check the robustness of the empirical findings under the same estimators as reported in Table III.4. The results of the regressions for the robustness checks are displayed in Table III.5. The coefficient of *Transfer* is positive and statistically significant, as shown in columns 3, 4, and 5 in Table III.5. These are the results of the OLS and static panel data estimators. This may lead to a wrong conclusion that *Transfer* boosts own revenue generation at the subnational level in Nigeria, which may not hold for reasons stated in Section 3.2.2.

Table III.5: The impact of gross intergovernmental transfers on own revenue generation of subnational governments in Nigeria

Variable	OLS	FE	RE	OLS	RE	2SLS	SGMM	SGMM
Log of transfer	0.2556	0.1225	0.2270*	0.3686*	0.2573**	-0.6694*	0.2239	0.1839
	(0.2458)	(0.1471)	(0.1221)	(0.2113)	(0.1288)	(0.3722)	(0.2112)	(0.1953)
Log of transfer (t-1)							-0.1302	-0.2623*
							(0.1595)	(0.1518)
Log of own revenue (t-1)							0.3639*	0.6859***
							(0.1918)	(0.1939)
Log of population density	0.1942*	1.8356*	0.3551***	-0.0277	0.1338	-0.1227	0.2239	0.1161
	(0.1021)	(0.9889)	(0.1311)	(0.1516)	(0.1768)	(0.1893)	(0.1717)	(0.1314)
Election year	-0.1867***	-0.1213**	-0.1451***	-0.1895***	-0.1375***	-0.1281*	-0.1241*	-0.1400**
	(0.0612)	(0.0451)	(0.0487)	(0.0605)	(0.0474)	(0.0665)	(0.0732)	(0.0628)
Log of agricultural loan	0.0822	0.0498*	0.0433	0.1278**	0.0482*	0.0422	0.1551	0.0924
	(0.0703)	(0.0272)	(0.0287)	(0.0627)	(0.0283)	(0.0884)	(0.1257)	(0.0924)
Children population	-0.0003	-0.0031	0.0006	0.0039*	0.0037**	-0.0011	-0.0002	-0.0011
	(0.0017)	(0.0053)	(0.0012)	(0.0023)	(0.0017)	(0.0027)	(0.0020)	(0.0011)
Luminosity	0.0924**	-0.0025	0.0494**	0.0698**	0.0405*	0.1672***	0.0261	0.0378
	(0.0376)	(0.0261)	(0.0207)	(0.0343)	(0.0230)	(0.0379)	(0.0328)	(0.0325)
Log of fragmentation				-0.8895**	-1.0164***	-0.6635		
				(0.3949)	(0.3889)	(0.5160)		
Edu. developed state				0.5971**	0.5043*	0.4739*		
				(0.2324)	(0.2805)	(0.2613)		
Log of distance to FCT				-0.0553	0.0295	-0.0235		
				(0.1219)	(0.1199)	(0.1566)		
R^2	0.52	0.12	0.53	0.60	0.63	0.44		
Rho		0.95	0.76		0.72			
RMSE	0.61	0.29	0.32	0.56	0.32	0.65		
BP LM stat			364.51***		313.44***			
Hausman test		14.70**						
KP *rk* LM stat (p value)						0.04		
AR1 (p value)							0.08	0.05
AR2 (p value)							0.71	0.62
Hansen stat (p value)						0.57	0.60	0.57
No of instruments						11	32	33
Observation	250	250	250	250	250	250	215	215

Significance levels: *: 10%, **: 5%, ***: 1%. Clustered robust standard errors at the state level are in parentheses. The dependent variable is own revenue per capita while the transfer is the gross transfer per capita. Edu. developed state refers to *Educationally developed state*. RMSE means Root Mean Squared Error. Results in columns 1-6 are estimates of equation (1) using various estimators while the results for equation (2) are shown in columns 7-8. The instruments for the 2SLS in column 6 are *Fragmentation* and *Distance to FCT* in level and the Kleibergen-Paap Wald *rk* F statistic for weak identification test is 15.94. For column 7, the IV-style instrument is *Distance to FCT* in level while *Fragmentation* and *Distance to FCT* in level are used as IV-style instruments in the result displayed in column 8. BP LM stat refers to the Breusch-Pagan Langragian Multiplier statistic. KP *rk* LM stat refers to Kleibergen-Paap *rk* Langragian Multiplier statistic (p-value). Number of units (n) is 36 and they are the 36 autonomous second-level administrative units (states) in Nigeria. AR1 and AR2 are Arrelano-Bond test for AR1 and AR2 respectively in first difference. Source: Author's computation.

For IV/2SLS and SGMM models in Table III.5, the results are similar as depicted in Table III.4. However, in column 7, Table III.5 under the SGMM estimator with only *Distance to FCT* in level as the IV-style instrument, the lag of *Transfer* is not statistically significant compared with the result in column 7, Table III.4. This may be attributed to the use of one instrument. Also, it is argued that the result in column 8, Table III.5 with *Fragmentation* and *Distance to FCT* in level as IV-style instruments confirms the relevance of *Fragmentation* used as an additional instrument to distance used by Gisselquist *et al.* (2016) and Masaki (2018). Under same column 8, Table III.5, the coefficient of the lag of *Transfer* at -0.26 is more negative than the coefficient of *Transfer* of 0.18 if it had been statistically significant. This further strengthens the validity of the result. According to the standard theory that the transfer from the central government is a reduction in the tax liability of economic agents at subnational jurisdictions. Thus, it is required that the coefficients of both *Transfer* and lag of *Transfer* should be greater than zero for the central government transfers to subnational governments to have positive effects on own revenue mobilization. However, the results of this study point to the contrary. This suggests that transfers are not being used as a launchpad to develop the capacity for own revenue generation at the subnational level in Nigeria. This finding is attributed to corruption in tax administration, wrong usage of collected taxes, and wastage of transfers from the federal government.

6. Conclusion

Under a multi-level government, different levels of government exist as a political cum economic entity. This makes allocation of expenditure functions and revenue assignment a *sine qua non* for the proper functioning of the state. The gain in this approach to governance is the improved allocation of resources in the public sector. The design of the system of fiscal federalism is crucial for the benefits of decentralisation to be realisable. To this extent, incomplete fiscal decentralisation not only turns out to hunt the system, but it also strains the functioning of the state. This is because incomplete decentralisation breeds ills, such as moral hazard, tax exporting, debt crisis, and bailout, that are inimical to the functioning of the federal system of government.

One of the significant problems of incomplete fiscal decentralisation is that the central government assumes the role of the distributor of the commonwealth, whereby it shares its tax revenues and other incomes with subnational governments. The purpose of this may be to help subnational governments to develop the capacity for own revenue mobilisation. It turns out that it breeds transfer dependency and competition for more massive transfers, particularly where federal transfers form a significant chunk of revenues of subnational governments. In the case of Nigeria, the dependence of subnational governments on transfers

from the central government is in the region of 75 percent to 95 percent on average. It becomes almost impossible for subnational governments not to engage in borrowings to meet their unbridled consumption expenditures in anticipation of transfers and bailout from the central government. This makes them worry less about increasing own revenue mobilisation. The incentive scheme in ceaseless cheap transfers does not encourage the mobilisation of own revenues for developmental purposes and proper functioning of the states. The inability to wean the subnational governments off transfer dependency brings about the problem of bailouts. Bailouts are required when the subnational governments run into debt crises as experienced recently in Nigeria.

The result of this study shows there is a problem of transfer dependency among subnational governments. Transfers crowd out own revenues of subnational governments in Nigeria. Our finding is similar to the conclusion from Morgues and Benin (2012) on their study on Ghana. But, it differs from the results from the studies by Masaki (2018) and Caldeira and Rota-Graziosa (2014) on Tanzania and Benin, respectively. The finding suggests that states are only responding to the incentive scheme in intergovernmental transfers in Nigeria. This is so as the federal government tries to balance development across subnational units by using equality as a significant determinant of transfers to subnational units. This discourages own revenue mobilisation as any subnational government can expect large transfers with little or no effort. Though the transfers are expected to be used for the provision of services and capacity building for the development of states, it does not appear that the transfers made to subnational governments are used to build capacity for own revenue collection. This has its root in the way states were created. Besides, this may be linked to the problem of corrupt tax administration, mismanagement of collected own revenues, and the misuse of transfers from the federal government at the state level. The issues of corruption and mismanagement may have made it difficult to enforce the tax law and revenue collection at subnational levels in Nigeria. Taxpayers want to see the public goods provided for the taxes they pay. Where this is impossible, tax compliance becomes a problem. The subnational governments in Nigeria rarely meet the needs of the people. This may account for lack of interest in fulfilling the civic responsibility of tax payment on the part of the citizens of Nigeria.

Though the coefficient of *Lag of own revenue* indicates that the revenue collection is correlated, it appears the efforts are not enough. The states are not exploring all available options within the span of revenue assignment laws in revenue mobilisation (Chapter Two, Table II.A5 p. 41), notwithstanding that revenue assignment is skewed in favour of the federal government in Nigeria. There is a problem of moral hazard on the part of state governments due to incomplete decentralisation. There is a wide tax gap between what

is collected in tax revenues and what can be collected in almost all states of the federation. This can be attributed to weak tax efforts and poor tax administration. In addition to the reasons stated above, corruption and wastage of public funds may have informed the need to woo the electorate with tax policy in the period of elections. As the coefficient of *Election year* shows, including the information on Table III.1 for the election years of 2007 and 2011, revenue collection goes down during election years. This may not be necessary if the states are discharging their responsibilities to the people. The electorate will pay their taxes without the need to be wooed for elections.

By way of policy recommendation, there is a need to review the extant revenue assignment laws in Nigeria in favour of states. States should be able to use their comparative advantages in revenue mobilisation. They should also have some freedom to vary some tax rates within their jurisdictions where they share tax administration with the federal government. This will help to reverse the incomplete decentralisation arrangement and ensure that subnational governments are encouraged to be self-reliant by generating more than 60 percent as own revenues in their total revenues.[62] Such a provision will bring about positive competition among subnational governments not just in revenue mobilisation but also in almost all facets of development. This should be followed with strict rules on revenue management and public debts to wean the states off loans from commercial banks and other lenders. As obtainable in the United States of America where Nigeria copied her federal system of government, there is a need for rules on public debts at the subnational levels, particularly concerning access to the capital market.[63] This requires the enforcement of the existing regulations in the *Fiscal Responsibility Act* (FRA) and the introduction of new rules. Since there will always be room for revenue sharing, no state should be allowed to budget more than 110 percent of the average of its transfers and revenues for the two previous years in expected transfers and own revenues for a fiscal year. This will prevent a situation whereby the implementation of budget laws will be used as an excuse for the unnecessary accumulation of debts[64] that may plunge the federation into unnecessary macroeconomic problems.

[62] The dependence on the federal government is a major indicator of the common pool problem in Nigeria. The design of appropriate institutions to change the incentives facing the subnational governments is the only means to reduce substantially over appropriation based on resource-control sentiments (Ostrom & Gardner, 1993; Ostrom, 1999).

[63] The banking reform of 2004, that restricts the participation of the subnational governments in the ownership of commercial banks, targets some forms of control at the subnational governments. Access to the capital market should be checked. Unchecked access to money and capital markets discourage the need for own revenue mobilization and amount to loosening monetary policy as unregulated subnational governments use of debts amount to sharing control over monetary policy with the federal government.

[64] The current arrangement where the approval of the Senate is sought for borrowings of subnational governments is not working. A case in point is the borrowing from the World Bank by the Edo State that got approval while that of Kaduna State was rejected. It has become a mere political tool for asserting political power between the executive governors and senators from their states. Besides, the scrutiny is not sincere and thorough.

Appendix A

Table III.A1: Descriptive statistics for the year 2007

Variable	Mean	St. Dev.	Min	Max
Own revenue	1,643.92	2,478.99	120.27	13,647.10
Transfer	15,006.14	12,479.75	5,931.73	65,343.81
Population density	307.77	425.36	40.77	2,482.59
Agricultural loan	48.24	51.25	5.56	230.35
Children population	1,620.00	710.71	712.87	3,930.00
Luminosity	2.14	4.06	.03	17.58
Fragmentation	21.33	7.15	8.00	44.00
Distance to FCT	522.78	200.37	156.00	957.00
Educationally developed state	.36		0	1

Notes: Data is sourced from the Central Bank of Nigeria (CBN), Joint Tax Board (JTB), National Bureau of Statistics (NBS), NOAA's National Centre for Environmental Information, and Office of the Accountant General of the Federation (OAGF). The number of states is 36. The year 2007 is an election year. Own revenue, transfer and agricultural loan are in per capita term. Children population is in '000. Distance to FCT is the distance to the Federal Capital Territory from a state. All dummy variables are generated by the author based on public information. Source: Author's computation.

Table III.A2: Descriptive statistics for the year 2013

Variable	Mean	St. Dev.	Min	Max
Own revenue	2,197.78	2,793.87	283.68	14,551.86
Transfer	13,115.92	11,084.41	5,479.56	63,050.83
Population density	370.76	514.62	48.52	3,008.09
Agricultural loan	40.48	33.31	4.35	152.86
Children population	1,950.00	868.50	848.36	4,790.00
Luminosity	3.06	4.77	.07	19.67
Fragmentation	21.33	7.15	8.00	44.00
Distance	522.78	200.37	156.00	957.00
Election year	.03		0	1
Educationally developed state	.36		0	1

Notes: Data is sourced from the Central Bank of Nigeria (CBN), Joint Tax Board (JTB), National Bureau of Statistics (NBS), NOAA's National Centre for Environmental Information, and Office of the Accountant General of the Federation (OAGF). The number of units is 36. Own revenue, transfer and agricultural loan are in per capita term. Children population is in '000. Distance to FCT is the distance to the Federal Capital Territory from a state. All dummy variables are generated by the author based on public information. Source: Author's computation.

Chapter IV: The Effect of Decentralisation on Access to Sanitation and Water Services

1. Introduction

The United Nations (UN) agencies such as the World Health Organisation (WHO) and the United Nations Children's Fund (UNICEF) started data collection on drinking-water and sanitation around the globe in 1990. In 1990, 77 percent of the world had access to drinkable water from improved sources, but only 54 percent had access to improved sanitation facilities (WHO, 2008). Since that year, the WHO/UNICEF Joint Monitoring Programme (JMP) had been in place to monitor and keep data on countries' progress in meeting drinking-water supply and availability of sanitation facilities. Predominantly in the 1990s, lack of drinking water and inadequate sanitation facilities were global challenges. The trend in the data reported from many countries might have informed the inclusion of access to drinkable water and sanitation facilities among the targets of Millennium Development Goals (MDGs).

In 2000, Member States of the UN approved the Millennium Declaration, which was translated into eight MDGs. This was to bring an end to poverty in all its ramifications, including improved access to safe drinking water and sanitation facilities. Under the MDGs program, the target for water and sanitation were measured in terms of the proportion of the population using improved sources of drinking water and the proportion of the population having access to improved sanitation facilities respectively. According to UN (WHO/UNICEF, 2015), the improved source of drinking water means safe drinking water, which could come from piped water, protected wells, and any other suitable source of drinking water. Whereas, improved sanitation is any sanitation facility that guarantees the hygienic separation of human excreta from human contact.

Much has been achieved under the MDGs, especially in the provision of drinking water and sanitation facilities, but there are still rooms for improvement. At the time of winding down the program in 2015 to be supplanted with another starting from 2016, UN (WHO/UNICEF, 2015) declares in her MDGs report that 147 countries have met drinking water target, 95 countries have met the sanitation target, and 77 countries have met both globally. Still, many people around the world are without access to drinkable water and improved sanitation facilities. Around the world, 2.1 billion people are without potable water at home; of these, 263 million people spend over 30 minutes per round trip to get water, 159 million people drink water from unimproved sources, and 844 million people do not have access to essential drinkable water. On sanitation, 4.5 billion people do not have access to toilets at home for safe disposal of excreta; of these, 2.3 billion lack essential sanitation services, 892 million practice open defecation, while 600 million share toilet facilities with other households (WHO/UNICEF, 2015).

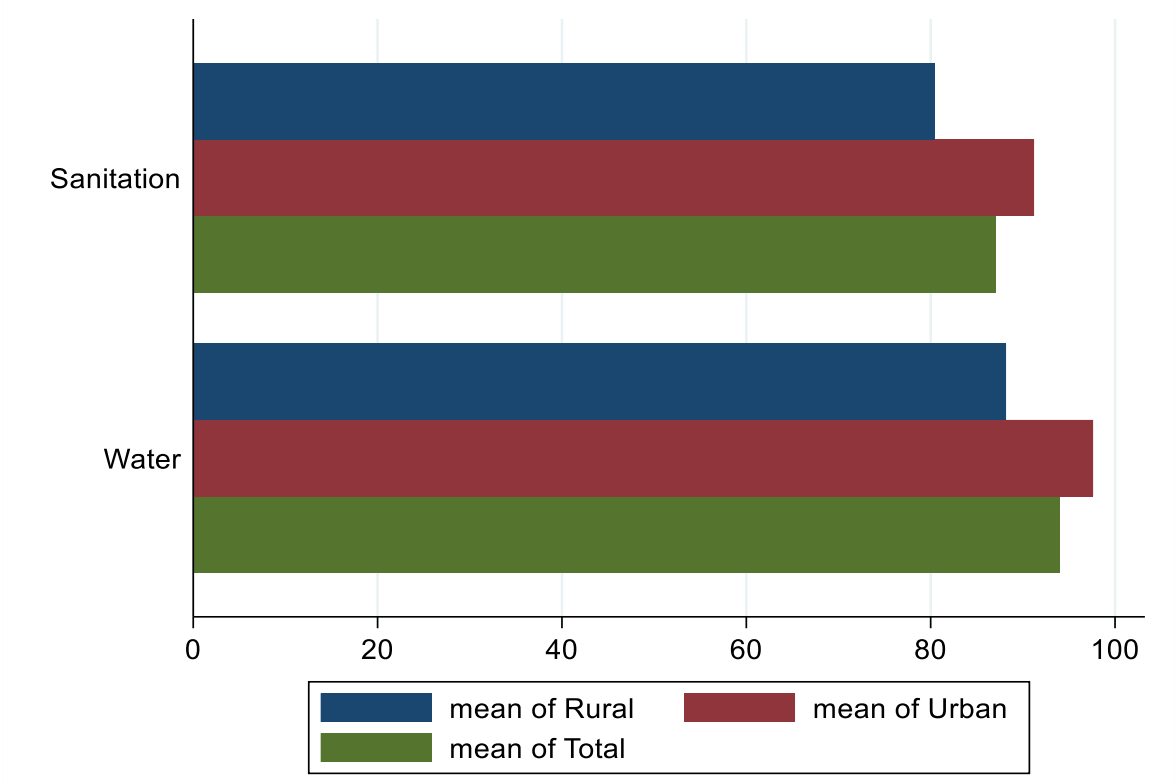
The inability to eradicate the problem of poor sanitation and lack of drinking water has made the inclusion of water and sanitation, including improved hygiene, which was not part of the MDGs, as goal number 6 in the Sustainable Development Goals (SDGs) program, which encompasses 17 goals, inevitable. The SDGs took off in 2016, and the aim is to go beyond MDGs' achievements on poverty and hunger in all ramifications by 2030. Under the SDGs, new indicators have been evolved for water and sanitation facilities provisions. Unlike under the MDGs, indicators for measuring improvement in drinking water are location on premises, availability, and compliant with the stated standard. On the other hand, improved sanitation is tracked based on sanitation facility, which is not shared with other households, and where excreta are safely disposed and managed offsite. The JMP establishes 'service ladders' with five rungs for monitoring both drinking-water and sanitation. The service ladders for sanitation have open defecation, unimproved, limited, basic, and safely managed. In contrast, the service ladders for drinkable water have the followings, from the lowest rung to the top: surface water, unimproved, limited, basic, and safely managed (WHO/UNICEF, 2017).

The global effort directed at the eradication of poor sanitation and lack of drinking water is not unconnected with their significant knock-on effects on the economy and the individuals composing it. Many people die around the world due to causes that are directly linked to poor sanitation and lack of drinkable water. The level of morbidity in an environment with a lack of drinking water and poor sanitation is usually high. According to WHO (2008), half of the child malnutrition is directly linked to unsafe water, inadequate sanitation, and poor hygiene. It has also been established that the loss of productivity arising from water and sanitation-related infections result in about 5 percent loss in GDP in many countries, especially in developing countries (WHO, 2012). Considering this vast economic loss, UN agencies are working to encourage nations to avoid these losses by investing in these essential services; and, also mobilising funds to assist in meeting the cost of the investment required from donor agencies. WHO (2012) estimates that for every $1 invested in water and sanitation-related services brings a return of about $4 in productivity gain. Despite the apparent benefit, many nations cannot meet the enormous investment required for water and sanitation provision. They rely on funds from donors. The gap in meeting these essential services globally under the WASH (Water, Sanitation and Hygiene) targets of SDGs 6 has been put at $1.7 trillion (Hutton & Varughese, 2016).

The above gloomy situation of water and sanitation around the globe has motivated this work. Most of the areas that are less served in many countries are located outside the urban areas (Figure IV.1). In response to this, we set to examine if the problems can be tackled through the governance architecture of

decentralisation. Environmental factors significantly affect these services, and subnational governments seem best positioned to address the issues. Besides, we observe that location-specific studies have been conducted on water and sanitation in the context of the governance architecture (Lary-Adjei & van Dijk, 2012; Asthana, 2003; Oates, 2002; Dinan, Cropper & Portney, 1999). However, despite the problems posed by the lack of water and sanitation services globally, there is a dearth of cross-country studies conducted on the impact of decentralised governance architecture on sanitation and water services. Therefore, this study is an attempt to fill this gap. The study examines the effect of decentralisation on improved access to water and sanitation services. The organisation of the study is structured as follows. Section two discusses the concept of decentralisation and its measurement and the relevant literature to the study. Section three provides information on methodology and data, econometric strategy and estimation issues. While in section four, the results of the econometric estimation are analysed. The study is concluded in section five.

Figure IV.1: A Bar chart showing the average population with improved access to water and sanitation in rural and urban areas, and total population with improved access, 1991-2014



Source: Author's Computation.

2. Literature review

Under this section, the study looks at the concept of decentralisation and its measurement. A literature survey is also conducted on the impact of decentralisation on other government policy areas and sanitation and water.

2.1 Decentralisation: conceptual and measurement issues

Decentralisation describes the process of transferring fiscal powers from the central government to subnational governments to increase the provision of public outputs and tailor such outputs to local needs. This definition is limited to the fiscal perspective of decentralisation. There are political and administrative views of decentralisation. The constitutional structure of the state addresses the political angle of decentralisation; a state is considered decentralised when it operates a federal constitution. Also, the process of the emergence of local officials is factored into the political definition of decentralisation. From the administrative perspective, the power of the lower levels of government determines the level of administrative decentralisation (Martinez-Vazquez, Lago-Penãs & Sacchi, 2017). By and large, decentralisation is an instrument being employed to improve the performance of public sectors (Oates, 1972, 1999).[65] Transferring power to local people to run their governments and provide their public goods is seen as one of the means to accelerate development, especially in developing nations (Smoke, Loffler & Bossi, 2013). Based on economies of scale which arises from externalities/spillovers and factors mobility across jurisdictions, central planning may be preferred to devolution as the central government may be able to adequately internalise the effect of economic activities (Veiga, Kurian & Ardakanian, 2015). While based on information asymmetry and costs and benefits,[66] it appears more reasonable to allow for local provision of public services. However, issues of information and costs and benefits may appear stronger in some cases which may justify the local provision of public goods and the need for decentralisation.[67]

Decentralisation assumes a different meaning in economics as compared with political science. The term does not depend on the constitutional structure of a state; though, the constitution expressly specifies the

[65] The literature on multi-level government recognises three types of decentralisation, regardless of the constitutional structure of a state: deconcentration, delegation, and devolution, from the weakest to the strongest. All involve the transfers of fiscal power and authority over certain functions to subnational governments. However, the power to act without recourse to the central government varies under each form of decentralisation (see Blume & Voigt, 2011, for some details).

[66] This may depend on the nature of the goods and/or services being produced.

[67] From a functional perspective, social protection is the least decentralised function while subnational governments play significant roles in services such as health, education, housing and environmental protection (Veiga *et al.*, 2015).

power and autonomy of various levels of government in a federation.[68] The extent of the power exercised by lower tiers of government varies from country to country in both federal and unitary states and may change in either direction over time. A federal state by the constitution (e.g. Nigeria) may be less decentralised when compared with a nominally unitary state (e.g. the United Kingdom). By and large, in the field of economics, all public sectors are more or less decentralised as different levels of government are in charge of the production of various public goods and services with different levels of authority (Oates, 1972, 1999). For multiple levels of government to perform their duties, governments at various levels exercise some fiscal authorities over their jurisdictions. These include the power to tax and raise fund through borrowing. Tax-assignment addresses the issue of the vertical fiscal imbalance in revenue allocation in a federation. Issues of capacity, cost and efficiency are factors in assigning tax functions to various tiers of government. The central government is usually empowered to raise certain taxes because of the economy and efficiency of doing so at the central level. This leaves the central government with a large share of revenues from taxes. Hence, the need for central government to make intergovernmental grants to lower tiers of government. In addition, the horizontal fiscal imbalance at subnational levels in terms of revenue-generating capacity and the need for functions at subnational units to be efficiently and effectively performed, there is a need for transfers to be made to them.

Decentralisation may be measured in different ways, depending on the definition and perspective. It is measured using fiscal decentralisation indicators such as ratios of subnational-centre revenues, subnational-centre expenditures, and vertical imbalance. Decentralisation is also measured using political decentralisation indicators such as local elections and political divisions, and structural and administrative decentralisation indicators (Martinez-Vazquez and Timofeev, 2010; Blume and Voigt, 2011; Dzobek, Mangas & Kufa, 2011; Martinez-Vazquez *et al.*, 2017). These indicators are measured in several ways. According to Martinez-Vazquez *et al.* (2017 p. 1098), "no single measure of decentralisation can capture all the multiple dimensions that decentralisation offers." Notwithstanding the shortcomings of any of these measures, this study will make use of the fiscal decentralisation indicators in econometric estimation.

Specifically, the share of subnational government revenues in total government revenues and the share of subnational government expenditures in total government expenditures will be used in this study as measures of decentralisation. These are constructed from the IMF's Government Finance Statistics (GFS).

[68] Decentralisation is not a one-size fit all affairs. There is a great diversity in this issue. Gómez-Reino and Martinez-Vazquez (2013) report in a study involving a sample of 197 countries that 101 countries have two levels of sub-national governments, 50 countries have three levels of sub-national governments, 35 countries have one and 10 countries have 4 tiers of governments. Two extreme cases feature in the study: Kiribati has no local government, while India has more than 240,000 local governments.

There are measurement issues with these measures of decentralisation.[69] Even so, these measures of decentralisation constructed from the GFS data remain the most widely used in empirical studies. The major problem with these measures is the aggregation of data in the GFS. Information at the subnational level is aggregated, making it difficult to account for heterogeneity between tiers and within tiers of government under decentralisation. Also, there is no known measure to account for the efficiency of use of government funds at any of the tiers of government. The level of reportage of data varies across countries and regions. Developed economies report more data than developing economies. This introduces some form of selection bias into the information.

2.2 The impact of decentralisation in other government policy areas

The goal of decentralisation is to accelerate development, tailor public outputs towards local needs, and bring government closer to the governed (Oates, 1999). The effects of decentralisation in many other policy areas have been studied. These policy areas include health, education, governance, growth, poverty and inequality, public debt, revenue efforts of subnational governments to mention but a few. On a general note, the result is mixed for the effects of decentralisation on growth. However, studies have established that decentralisation produces positive impacts in the service areas, especially in the provision of health services and education. It has also been found to be of crucial importance in governance. On the dark side of decentralisation, Reinikka and Svensson (2004) posit that decentralisation may bring about what is termed local capture. This occurs when resources transfer to subnational governments for developmental purposes are cornered by the local elites for their narrow interests (Prud'homme, 1995). Excessive fragmentation resulting from decentralisation sometimes leads to loss of economies of scale in the production of goods and services. These undesirable outcomes of decentralisation may have informed the position of Ahmad, Davarajan, Khemani and Shah (2006) that the process of implementing decentralisation can be as important as the design of the system in influencing service delivery outcomes. A summary of selected studies is displayed in Table IV.1 below.

[69] There are attempts at developing other measures. These are also not without their challenges. See Martinez-Vazquez, Lago-Penãs & Sacchi (2017, p. 1098-1099) for a recent discussion of these issues.

Table IV.1: Impact of decentralisation in other policy areas

Author	Country/Period	Method	Variable	Impact
Policy area: Health				
Cantarero and Pascual (2008)	Spain/1992-2003	FE, RE	Dependent variable(s): IMR and LE Independent variables: Ratio of subnational healthcare expenditures to total health expenditures for all levels of government as a measure of FD, and others	(+) FD improves LE (-) FD reduces IMR
Rubio (2011)	Canada/1979-1995	FE	Dependent variable(s): IMR Independent variables: Ratio of provincial health expenditures to total healthcare expenditures as a measure of FD, and others	(-) FD reduces IMR
Soto, Farfan, and Lorant (2012)	Colombia/1998-2007	FE	Dependent variable(s): IMR Independent variables: Ratio of local healthcare expenditures to total health expenditures as a measure of FD, and others	(-) FD Reduces IMR
Brock, Jin, and Zeng (2015)	China/1980-2003	Stochastic frontier method	Dependent variable(s): IMR Independent variables: Ratio of per capita provincial budgetary expenditures to the sum of per capita central budgetary and provincial budgetary expenditures as a measure of FD, and others	(+) FD does not reduce IMR
Faguet and Sánchez (2014)	Colombia/1994-2004	FE	Dependent variable(s): change in the poor population covered by public health insurance Independent variables: own resources as a share of total health expenditures as a measure of FD, and others	(+) FD improves health outcome
Policy area: Education				
Faguet and Sánchez (2014)	Colombia/1994-2004	FE	Dependent variable(s): Change in the number of students enrolled in public schools Independent variables: Own resources as a share of total education expenditures as a measure of FD, and others	(+) FD improves educational outcome
Barankay and Lockwood (2007)	Switzerland/1982-2000	FE	Dependent variable(s): Public education provision Independent variables: Ratio of counties' educational expenditures to the sum of counties and cantonal educational expenditures as a measure of FD, and others	(+) FD improves public educational services
Falch and Fisher (2012)	25 OECD member countries/1980-2000	FE	Dependent variable(s): Students' achievement scores in mathematics and natural science Independent variables: Lagged of the ratio of subnational spending to national government spending as measure of FD, and others	(+) FD raises educational achievements
Diaz-Serrano and Meix-Llop (2012)	22 countries/1950-2006	FE	Dependent variable(s): Students' achievements in mathematics, reading, and science Independent variables: Political decentralisation (PD) indicators, fiscal decentralisation (FD) indicators, and others	(+) FD improves students' achievements (-/+) PD produces mixed effects.
Policy area: Governance				
Dreher and Fisher (2010)	109 countries/1976-2000	RE negative binomial estimator	Dependent variable(s): Transnational terrorism Independent variables: Sub-federal government units share in total expenditures by all levels of government, with/without grant in expenditures as measures of FD; dummy for political autonomy as a measure of PD, and others	(-) FD reduces transnational terror attack () PD has no effect

Kyriacon and Rosa-Segalés (2011)	27 OECD member countries/1996-2005	FE, RE, IV	Dependent variable(s): Government quality Independent variables: Ratio of subnational expenditures to consolidated general expenditures, ratio of subnational revenues to consolidated general revenues as measures of FD, and others	(+) FD positively correlates with government quality
Dreher and Fisher (2011)	70 countries/1998-2004	FE negative binomial estimator	Dependent variable(s): Domestic terror attack Independent variables: Sub-federal government units share in total expenditures by all levels of government, with/without grant in expenditures as measures of FD; dummy for political autonomy as a measure of PD, and others	(-) FD reduces domestic terror attack () PD has no effect
Lightart and Oudheusden (2015)	42 countries/1994-2007	OLS, Ordered Logit, IV/2SLS	Dependent variable(s): Trust in national government, trust in parliament, trust in political parties, trust in civil services, trust in armed forces, others Independent variables: share of subnational government expenditures in general government expenditures as a measure of FD, and others	(+) FD positively correlates with trust in government
Policy area: Growth				
Davoodi and Zou (1998)	46 countries/1970-1989	OLS	Dependent variable(s): Per capita gross domestic products (GDP) growth Independent variables: Ratio of subnational government spending to total government spending as a measure of FD, and others	(-) For developing countries, FD correlates negatively with growth but no effect in developed countries
Thiessen (2003)	21 High OECD member countries/1973-1998	Cross-section regressions	Dependent variable(s): Total investment share in GDP (I/GDP), Total factor productivity growth (TFPG) Independent variables: Various indicators of FD, and others	(+/-) FD produces inverted-U relationship with growth
Thornton (2007)	19 OECD member countries/1980-2000	OLS	Dependent variable(s): Real GDP growth per capita Independent variables: Degree of revenue autonomy of subnational government as a measure of FD, and others	() FD has no effect on economic growth
Rodríguez-Rose and Ezcurra (2011)	21 OECD member countries/1990-2005	Correlation, OLS	Dependent variable(s): Growth rate of GDP per capita Independent variables: Indicators of expenditure shares (EDP), indicators of revenue share (RD), indicators of political decentralisation (PD) and administrative decentralisation (AD) as measures of FD, and others	(-) Both EPD and RD reduces growth. (-/+) AD and PD produces mixed results
Gemmell, Kneller and Sanz (2013)	23 OECD member countries/1972-2005	Pooled Mead Group (PMG), PMG/IV	Dependent variable(s): Rate of GDP growth Independent variables: Various indicators of revenue decentralisation, various indicators of expenditure decentralisation as measures of FD, and others	(+) RD increases growth (-) EPD reduces growth
Policy area: Poverty and inequality				
Sepulveda and Martinez-Vazquez (2011)	34 countries/1971-2000	FE, RE, RE 2SLS/IV	Dependent variable(s): Poverty head count, poverty gap; Inequality as measured by gini (disposable income) and gini (gross income) Independent variables: share of subnational governments (net of transfers to other levels of government) in total expenditures consolidated central budget measured in percentages as a measure of FD, and others	() FD does not reduce poverty, but it has conditional negative effect on inequality

Sacchi and Saloti (2014)	23 countries/1971-2000	FE, FGLS, IV/2SLS	Dependent variable(s): Gini index estimates of gross household income inequality Independent variables: Tax revenues decentralisation (TRD) indicators, expenditures decentralisation indicators as measures of FD, and others	(+) FD increases inequality as measured by TRD
Policy area: Debt and regional revenue efforts				
Baskaran (2010)	17 OECD member countries/1975-2001	Correlation, FE, GMM	Dependent variable(s): Ratio of financial liability to GDP Independent variables: Ratio of subnational government share of total government (EPD), Subnational revenues from taxes for which subnational governments determine rates and/or define bases as a share of general government tax revenues (RD), subnational revenues from federal grants as a share of total subnational revenues (VFI) as measures of FD, and others	(-) When EPD is used as a measure of, FD, FD reduces public debt. () Both RD and VFI do not have any impact on the level of public debt
Huang, Lo and Wen (2012)	China/1996-2006	FE	Dependent variable(s): Various indicators of regional revenue capacity/efforts Independent variables: Ratio of the local government's total revenues less the amount paid to central government to total revenues (RD) as a measure of FD, and others	(+) RD leads to increase in fiscal efforts

Notes: FE means fixed effects estimator, RE means random effects estimator, GMM implies general method of moments, FD means fiscal decentralisation, VFI implies vertical fiscal imbalance, EPD means expenditure decentralisation, RD means revenue decentralisation, IMR means infant mortality rate, LE means life expectancy. Source: Author's compilation.

2.3 Sanitation and water services: A survey

Water and sanitation services are essential in reducing morbidity, and in improving health, welfare, and development. Koola and Zwane (2014 p. 477) posit that "improving health and mitigating diarrheal morbidity is the underlying rationale for water and sanitation." Alsan and Goldin (2019), using historical data of late nineteenth and early twentieth centuries, conclude that the combination of sewerage and safe water treatment lowers under-five child mortality in Massachusetts, United States of America (US). This result is similar to the result obtained by Jaadla & Puur (2016) for Tartu, Estonia. Gamper-Rabindran, Khan and Timmins (2010) find that provision of piped water reduces the level of under-1 infant mortality in Brazil. This occurs through improvement in the water supply, which raises the level of wellness of infants. Fiscal decentralisation is consistently associated with lower infant mortality rates (Asfaw, Frohberg, James & Jütting, 2007; Robalino, Picazo & Voetberg, 2001), which may be attributed to the role of subnational government in the provision of sanitation and water services.

The level of political competition can influence the responsiveness of the government at any administrative level. Provision of public services, including water and sewerage services have been found to respond to

electoral competition in democracy at the local level in Mexico, particularly in Jalisco and Michoaćan (Hiskey, 2000), and in Brazil (Arvate, 2013). Cleary (2007) concludes that electoral competition does not impact the municipal government performance, which was measured in terms of public goods provision, but measures of electoral participation cause improved performance. The results suggest that municipalities where there is higher electoral participation by the citizens do better in the provision of services by connecting more houses with sewerage, and provision of potable water. However, Rosenzweige (2015) finds evidence that electoral competition improves public service provision, including pipe-borne water in Tanzania. Granados and Sánchez (2014) observe that improvement in the provision of water and sanitation services is associated with a reduction in child mortality where municipalities directly provide the services in Colombia, in contrast to municipalities that engage private companies. They recommend the direct provision of services by municipalities because the political interest of remaining in the office encourages political officeholders to provide better services. Zewari, Sowers and Weinthal (2011) argue that states in the Middle East and North Africa (MENA) make a poor investment in water and sanitation facilities, thereby failing to provide the services where they are most needed especially in informal settlements. Besides, they observe that centralisation of water and sanitation infrastructures contributes to the poor quality of services provided, while some areas are denied access to services.

Veiga *et al.* (2015) posit that it has become common practice to adopt decentralisation in the provision of essential services such as water and sewerage services. The central goal of decentralisation is the exercise of political decisions over what and how goods and services are produced at the local level of government. Indeed, the idea behind decentralisation is that local governments can improve welfare and development when resources of various jurisdictions are appropriately matched with their needs (Oates, 1972, 1999). On the arsenic rule standard in drinking water in the US, Oates (2002) argues that the standard should suit the circumstances of each district. This was in response to the centralised standard set by the US Environmental Protection Agency (EPA). The implication of this is that provision of water and sanitation services should be decentralised given the impact of natural/environmental factors in delivering these services. In effect, decentralisation of provision of water and sanitation services will improve the coverage of the services because drinking water availability, as well as quality, is highly susceptible to environmental quality and standard.

Dinan, Cropper and Portney (1999) posit that the imposition of a uniform standard in a federal state without consideration for the cost-benefit criterion of each locality results in inefficiency and welfare losses in water provision. This is echoed in the submission of Chattopadhyay (2012) that the central planning process leads

to inadequate provision of public goods and low quality of life. Ranganathan, Kamath and Baindur (2009) argue that decentralised provision of water and sanitation are being adopted around cities in India to fill the gap in these essential services. Laryea-Adjei and van Dijk (2012) conclude that decentralisation leads to improvement in water and sanitation services in Ghana. However, funding has been identified as the major constraint in achieving water and sanitation targets in the country (Awuah, Nyarko & Owusu, 2009). They observe that decentralisation aids provision of services in Temale and Savelugu-Nanto. Faguet and Sánchez (2014) note that decentralisation in Colombia improved access of the poor to public health facilities, including water and sanitation services.

Montgomery and Elimelech (2007) argue in favour of a decentralised approach in the provision of water and sanitation services for developing countries. They note that the implementation of large and centralised treatments is expensive and problematic in terms of maintenance. At the heart of this is the issue of efficiency in asset utilisation. The persistent water scarcity spurs decentralised management of river basin water resources (Dinar, Kemper, Blomquist & Kurukulasuriya, 2007). This, in many cases, leads to improved water provision. Availability of water and adequate sanitation facilities has significant knock-on effects on the economy. With decentralisation, these services can be made available at every subnational unit in any geopolitical space, and all the benefits of the availability can be internalised. It helps in meeting local needs, guarantees efficiency in infrastructural investment, distribution, and costs. Though Asthana (2003) finds that the efficiency of water utilities in expense and asset utilisation in Central India is poor, this should not be the basis for rejection of decentralisation as governance strategy in alleviating the problem of poor sanitation and water supply around the world. The environmental standard and quality of water are not the same across the studied areas. Thus financial/operating efficiency cannot be the only basis for measuring gain in decentralisation. The level of a contaminant in each decentralised unit will impact operating efficiency and profitability. Also, this will result in welfare losses if not sufficiently factored into this service which Asthana (2003) did not adequately consider. Herrera (2014) argues that the simultaneous implementation of market policies with decentralisation has a negative effect on the impact of decentralisation for sanitation and water services in Mexico. Herrera's (2014) conclusion negates the market efficiency criterion of Asthana (2003).

3. Methodology

3.1 The empirical model

Following the argument that decentralised governance architecture may help in improving the poor situation of drinking water supply and sanitation services around the globe, this study sets to answer two research questions. One, does decentralisation improve changes in access to sanitation and water services? The primary purpose of decentralisation is to bring governance close to the governed. This ensures the participation of the governed in the management of their affairs. It is reasoned that this governance architecture could help improve the provision of public services, including sanitation and water services. Based on the first research question, a measure of improved access to sanitation facilities and a measure of improved access to water services are regressed on measures of decentralisation and other covariates. Two measures of decentralisation: revenue share and expenditure share, one after the other, are used in this study. In relation to the first question is the issues of political competition in aiding the provision of public services under any political/governance arrangement. The responsiveness of government is linked with the level of political competition. So, we ask, does the impact of decentralisation on improved access to sanitation facilities and water sources depend on the level of political competition? This is tested through the interaction of the dummy variable for political competition with measures of decentralisation.

In order to answer the research questions articulated above, the model in equation (1) has been specified to investigate the relationship between decentralisation and water and sanitation services. A similar model has been used in a study by Sepulveda and Martinez-Vazquez (2011). They use the empirical model to analyse the effect of decentralisation on poverty and income inequalities. They regressed Gini coefficient/measure of poverty on measures of decentralisation, decentralisation interacted with government size, and other covariates using fixed effects, random effects, and generalised two-stage least squares estimators. The similarity in our study is that both studies examine the impact of decentralisation on social phenomena, analysing the decentralised governance architecture to improve human conditions. However, our studies differ based on the specificity of focus.

$$y_{it} = \beta MFD_{it-1} + \rho Political\ Competition_{it} + \psi Political\ Competition_{it} * MFD_{it-1} + \gamma Control_{it} + \alpha_i + \xi_{it} \quad (1)$$

where i indexes a country and t represents a year. The parameters of interest to be estimated in equation (1) are β, ρ, ψ, and γ. α_i is the individual effect of country i, it becomes α, homogenous intercept term for each country i when the model is estimated using pooled ordinary least squares (OLS); while ξ_{it} is the error term. The dependent variable, y_{it} in equation (1) represents two variables, sanitation and water services. In the first case, the dependent variable is the percentage of the total population with improved access to sanitation facilities for a country in a particular year. In the second case, the dependent variable is the percentage of the total population with improved access to water sources for a country in a particular year. MFD implies measures of fiscal decentralisation in one-year lag. Two measures of decentralisation are considered in this study: *Revenue share* is the ratio of revenues of the subnational governments to total government revenues, and *Expenditure share* is the ratio of expenditures of the subnational governments to total government expenditures. Since the decentralisation policy may not have a contemporaneous effect on the improved access to sanitation and water services because of policy lag, a one-year lag of the decentralisation variable is introduced for this reason. Each of the dependent variables is regressed on measures of decentralisation, along with other covariates, at a time. If decentralisation impacts improved access to sanitation and water services, the *a priori* expectation of the sign associated with the decentralisation variables is positive in the model.

The responsiveness of government is linked to the level of political competition (Hisky, 2000; Arvate, 2013; Rosenweig, 2015). A way of testing the responsiveness of the government in this study is through the interaction of a dummy variable for political competition with measures of decentralisation. The dummy, *Political competition* is generated from "*Polity2"* in Polity IV data.[70] The dummy variable is based on the work of Aidt and Eterovic (2011). In this study, *"Polity2"* score for a country in a particular year is normalised to 1 for a less politically competitive country that scores between -10 and 0; otherwise, a country is assigned a dummy of 0. The a priori expectation for the sign of the coefficient of the dummy variable is negative because the non-politically competitive countries will care less about the needs of the people. Also, we interact the dummy with the MFD. The interaction term makes the impact of decentralisation on sanitation and water services to be dependent on the level of *Political competition*. Thus, it measures the partial effect of MFD when *Political competition* is 1. It explains the impact of decentralisation on sanitation and water services in states that are less politically competitive. The impact of decentralisation on sanitation and water services for countries that are less politically competitive will be determined by the joint coefficients of decentralisation as measured by either *Revshare* or *Expshare* with the coefficient of the interaction term.

[70] See Centre for Systemic Peace, http://www.systemicpeace.org/inscrdata.html.

However, the expected sign for the coefficient associated with the interaction term is not definite. This stems from implications of the political environment on decentralisation arrangement with respect to both revenue and expenditure shares as measures of decentralisation.

Other covariates in the model are a measure of *Government size*, *Log GDP per capita*, *Log population density, Bureaucratic quality*, *Democratic accountability*, *Globalisation*, and *Internal conflict*. The size of government is constructed from data from the WDI as a proportion of the general government final consumption expenditure to gross domestic product (GDP).[71] This variable is important in explaining the production of public goods and services, namely water and sanitation (Sepulveda & Martinez-Vazquez, 2011). Thus, the expected sign of the coefficient of this variable is positive. The *Log GDP per capita* is the log of GDP per person in a nation in constant term. This is a measure of the level of development of any economy and the welfare level in the country. It also represents the average income per person in a year in a country. This is expected to be positively related to improved access to sanitation and water services. The richer a country is, the higher is the likelihood that essential services such as sanitation and water services are adequately provided to the entire population (Sepulveda & Martinez-Vazquez, 2011). The expected sign of the coefficient of this variable is positive. The *Log population density* is the log of the ratio of the total population to land area (in square kilometre) of a country in a particular year. The population density of a country may drive the provision of essential services such as sanitation and water services. A high population density indicates pressure on public facilities which requires the government to make more investment in basic services to meet the needs of the population. Thus, the expected sign of the coefficient of this variable is positive.

Bureaucratic quality is a measure of institutional quality in a country. It is an indicator of stability and bureaucratic quality denoting the risk of policy reversal in a country which is often caused by political pressure on the public service officers. A high-quality public service which ensures smoothness in government operations is an asset to any nation as public projects are monitored and implemented by public service officers. The data is obtained from ICRG, and the score for this variable ranges from 0 to 4. The developing countries which are high-risk countries with respect to bureaucratic quality are scored 4. In contrast, the low-risk countries which have their public service insulated from political pressure are scored 0. It is thus expected that *Bureaucratic quality* and provision of services are negatively correlated. *Democratic accountability* is vital for the provision of public services.[72] It is also an institutional factor; the data is obtained from ICRG with a score ranging from 1 to 6. It is a measure of the responsiveness of

[71] Both general government final consumption expenditure and GDP are in 2010 US$ constant term.
[72] Sepulveda & Martinez-Vazquez (2011) used the index of democracy.

government to its people under different democratic practices from alternating democracy to autarchy. It is also a measure the risk of collapse of the government. Countries with the lowest risk of government collapse receive the highest score of 6, while high-risk countries receive the lowest score of 1. This variable is expected to be positively correlated with improved access to sanitation and water services.

Globalisation is a composite measure of the economic, political, and social aspects of globalisation. It is an indicator of how countries are opened to global influence. Because of the information globalisation, events in a country are not independent of events in another country. As people share information about their development, it is expected that this will impact the provision of services in another country. Indeed, the influence of globalisation may have motivated the UN Millennium Development Goals (and now SGDs) to ensure the provision of a certain minimum standard of public services across the globe which necessitates the monitoring of provision of sanitation and water services. The progress of globalisation will ensure that the minimum services are provided across the world in almost uniform quality and quantity. This variable is expected to be positively correlated with improved access to sanitation and water provision. *Internal conflict* is a measure of the risk of internal strife and its impact on governance with subcomponent issues of civil war and coup threat, terrorism and political violence, and civil disorder. The absence of peace is a significant threat to governance. This eliminates all possibilities for development. By implication, no improvement in access to sanitation and water is possible in the absence of peace. According to the definition of ICRG, a high-risk country is scored 0, while a low-risk country is scored 4. It is expected that this will negatively correlate with the improved provision of sanitation and water services in a country. A summary of definitions and sources of the variables is provided in Table IV.A1 in Appendix A.

3.2 Data

The data for this study is panel data covering a period of twenty-four years from the year 1991 to the year 2014. This covers a long period over which the UN MDGs are vigorously pursued to reduce the problems of lack of drinkable water and improper sanitation across the world. The UN agencies started monitoring and data collection across the globe in 1991. Though data on improved access to drinkable water and sanitation is available for almost all the countries of the world, the sample size for this study is reduced to 68 because some countries did not report any data in GFS. It should be noted that the majority of countries in the sample are countries in the high-income group.[73] These countries have attained some considerable

[73] This classification is based on the World Bank classification for the year 2016 using the 2014 data.

level of access to drinkable water and sanitation at the time the data collection started. Notwithstanding, they stepped up the provision of these services to attain full coverage in their countries.

The data on improved access to sanitation and water is from the UN database reported in World Bank Development Indicators (WDI). Like the GFS data explained earlier, the UN data on sanitation and water services is vitiated by problems of aggregation and lack of definition for quality. While it gives the picture at the national level, it does not reveal the situation at the levels of the household and community. Though the data is disaggregated to provide information on the rural and urban areas, the information remains aggregated over these units. Moreover, there is a claim that the figures are overstated and do not represent the actual situation (Zawahri, Sowers & Weinthal, 2011). The data on revenue share and expenditure share is from the GFS from the IMF database. Normalised *"Polity2"* data for the political competition is from the Polity IV Project. Globalisation data is from the 2017 KOF[74] index of globalisation database; data on bureaucratic quality, democratic accountability, and internal conflict is from International Country Risk Guide (ICRG), while all other covariates are from World Bank Development Indicators (WDI).

The summary statistics of the data is displayed in Table IV.2 below. In addition to Table IV.2, more information on the summary statistics is available in Tables IV.A2 and IV.A3 in Appendix A. Each variable in the summary statistics table comes with information on overall, between, and within. This information is pertinent to the understanding of econometric strategies pursued in this study. Overall refers to the statistics computed for all countries in the dataset; in calculating the overall statistics, observations, N are used. The overall mean for Political competition is 0.11, while the standard deviation is 0.32. Between statistics explain the statistics computed for different countries in the dataset. Information about n is used in the computation of between statistics; it compares country to country. Within statistics are computed for each country in the dataset. It gives information about variation within each country. The within information may be negative because it is a deviation from each country's average. This explains the within minimum statistics of -0.84 for political competition in the summary statistics in Table IV.2.

[74] KOF refers to the Swiss Economic Institute.

Table IV.2: Summary statistics, 1991-2014

Variable		Mean	St. Dev.	Min.	Max.			Observation
Improved sanitation	Overall	87.04	16.41	16.90	100	N	=	1588
	Between		16.10	28.10	100	n	=	67
	Within		3.46	69.30	103.1	T-bar	=	23.70
Improved water	Overall	94.01	8.53	53.30	100	N	=	1622
	Between		8.04	58.40	100	n	=	68
	Within		2.96	72.10	113.5	T-bar	=	23.85
Revenue share	Overall	26.27	14.34	0.82	85.43	N	=	1151
	Between		15.61	0.87	84.78	n	=	68
	Within		3.91	7.69	45.79	T-bar	=	16.93
Expenditure share	Overall	23.94	14.11	1.35	76.61	N	=	1147
	Between		14.83	1.40	72.76	n	=	68
	Within		3.61	6.63	40.31	T-bar	=	16.87
Government size	Overall	18.11	5.51	3.79	49.29	N	=	1555
	Between		5.01	7.42	28.2	n	=	68
	Within		2.45	6.51	39.63	T-bar	=	22.87
Log GDP per capita	Overall	9.27	1.20	6.32	11.61	N	=	1611
	Between		1.18	6.83	11.40	n	=	68
	Within		0.23	8.47	10.09	T-bar	=	23.69
Log pop. density	Overall	4.13	1.22	0.36	6.25	N	=	1614
	Between		1.23	0.47	6.19	n	=	68
	Within		0.10	3.38	4.94	T-bar	=	23.74
Bureaucratic quality	Overall	2.76	1.02	0	4	N	=	1541
	Between		0.98	1	4	n	=	68
	Within		0.32	0.78	4.27	T-bar	=	22.66
Democratic acct.	Overall	4.77	1.33	1	6	N	=	1541
	Between		1.21	1.45	6	n	=	68
	Within		0.66	1.45	6.97	T-bar	=	22.66
Globalisation	Overall	66.58	15.94	24.7	92.84	N	=	1628
	Between		14.10	42.6	90.37	n	=	68
	Within		7.61	38.70	86.01	T-bar	=	23.94
Internal conflict	Overall	9.89	1.70	1.92	12	N	=	1541
	Between		1.33	5.60	12	n	=	68
	Within		1.05	2.84	13.16	T-bar	=	22.66
Political competition	Overall	0.11	0.32	0	1	N	=	1627
	Between		0.29	0	1	n	=	68
	Within		0.13	-0.84	1.07	T-bar	=	23.93

Notes: The data is sourced from UN, IMF, ICRG, WBI, Polity IV, and KOF index of globalisation. The Log GDP per capita is the log of gross domestic product (GDP) per capita. Log pop. density refers to log population density. Democratic acct. means democratic accountability. N is the number of observations for each variable for all countries. n refers to the number of countries observed for each variable; while T-bar is the average number of years a country is observed. Source: Author's computation.

3.3 Econometric issues and specification tests

Given the longitudinal dimension of the data for this study, three estimators are employed in econometric estimation. These estimators are pooled ordinary least squares estimator (OLS), fixed effects estimator (FE), and random effects estimator (RE). Before deploying any of the above-stated estimation strategies in the estimation of equation (1), it is considered appropriate to conduct a series of specification and diagnostic tests to check for issues that may negatively affect the consistency and efficiency of the parameter estimates of the econometric results for this study.

Correlation analysis of the variables obtained from the correlation matrix indicates that *Log GDP per capita* and *Globalisation* are highly and positively correlated in the region of 0.87. All other variables' correlation coefficients are below 0.87. Three tests are employed to check for the existence of the problem of heteroskedasticity in the data. With the Breusch-Pagan (BP) test for heteroskedasticity (Breusch & Pagan, 1979), the null hypothesis of constant error variance is rejected. Where improved access to sanitation services is the dependent variable, the null hypothesis is rejected with Chi-squared statistic of 236.14 and 243.08 at 1 percent level of significance for the model with revenue share and expenditure share among the regressors respectively. For improved access to water provision as the dependent variable, the null hypothesis for BP is rejected with Chi-squared statistic of 415.30 and 444.17 at 1 percent level of significance for the model with revenue share and expenditure share among the regressors respectively. The study exploits White's test for heteroskedasticity (White, 1980) to confirm the result from BP test because it is robust to other forms of heteroskedasticity. The null of homoskedasticity is rejected for all the models. In addition, the modified Wald test for groupwise heteroskedasticity (Greene, 2017) is employed to investigate further the problem of heteroskedasticity in the data. The null of homoskedasticity is rejected for all the models.

The Wooldridge test for autocorrelation in panel data (Drucker, 2003; Wooldridge, 2010) is employed to test for the existence of the problem of autocorrelation in the data. The null hypothesis of no serial correlation is rejected for all the models. Where improved access to sanitation is the dependent variable, the null hypothesis is rejected with F statistic of 4653.23 and 5393.14 at 1 percent level of significance for the model with revenue share and expenditure share among the regressors respectively. For the model with improved access to water provision as the dependent variable, the null of no serial correlation is rejected with F statistic of 2433.46 and 3215.89 at 1 percent level of significance for the model with revenue share and expenditure share among the regressors respectively. These identified problems can impact the efficiency and consistency of the regression estimates of this study. A clustered robust standard error at the

country level is reported for all the regression estimates. The clustered robust standard errors are robust to the problems of heteroskedasticity and autocorrelation within a country but not across countries because it replaces the assumption of the independence of the errors with the assumption that the errors are independent between clusters (countries).

3.4 Estimation strategy: OLS, FE, and RE

OLS is consistent and unbiased if there is no endogeneity problem or there is no covariance between regressors and the error term. If no covariance condition is satisfied, it provides the effect of the response variable on the unconditional population mean of the independent variable based on the law of iterated expectation. This shows the response of the conditional mean of the regressand Y (improved access to sanitation/water supply) to the dependent variable X (measures of decentralisation and other covariates) *ceteris paribus*. For pooled OLS, α_i becomes α because it is assumed that the individual effect is the same while the reverse holds under the FE estimator (Pesaran, 2015). The intercept and the slope coefficients are the same for all countries under the OLS estimator. OLS requires that the independent variables and the error term are contemporaneously uncorrelated. The error term in OLS is, however, affected by the problem of autocorrelation, which affects the efficiency and standard errors of estimates. This is due to the influence of the unobservable features that are not changing over time. It will be incorrect to assume that the level of coverage achieved in the provision of services in one period is not correlated with the following period. Therefore, a strategy to correct for autocorrelation is implemented in OLS by obtaining clustered robust standard errors for efficient and consistent estimates.

Unlike the OLS estimator, the intercept term varies over the individual country in the FE. The FE estimator is a regression method that helps to control for the unobserved individual country-specific effects which could have resulted in omitted variables in a panel data regression (Stock & Watson, 2012). The individual country effect may vary over countries. The FE regression method exploits the within variance of a country and explains the changes in a country over time. With this, the FE estimator can capture observable and unobservable individual specific and time-invariant differences. The FE estimator requires that there is no correlation between independent variables and the within-entity error term, which is *epsilon_it* in this study. The expected value of the deviation from the mean of the regressors and the error term is zero. This subsumes exogeneity condition which requires that the current, future, and past values of the regressors do not depend on the error term. This condition is necessary for an unbiased estimate of the individual effects (fixed effects) under this estimator.

The RE estimator is more efficient in relation to both OLS and FE in combining information from both within and between variances of the data. The central assumption under the RE estimator is the independence of the regressors and the composite error term; that is, the independent variables are not correlated with both *alpha_i* and *epsilon_it* in this model. Also, the remainder component is assumed not correlated while the serial correlation of the error term is associated with the individual component. The conditions as mentioned earlier must also be fulfilled to ensure that the least square estimates of the coefficients are unbiased and consistent. However, the standard errors of the least square estimator are wrong. A more efficient estimate of the standard errors can be obtained from the (feasible) generalised least squares (GLS) estimator by exploiting the structure of the variance-covariance matrix of the error term (Verbeek, 2017). This requires that the regressors are not correlated with the individual as well as the remainder components, which is most times unrealistic.

The Breusch-Pagan Lagrangian Multiplier (BP LM) test for random effects (Breusch & Pegan, 1980) helps in choosing an efficient estimator between OLS and RE estimators. The null hypothesis of this test is that the variance across units is zero, which implies OLS is efficient. However, this is almost always rejected in favour of the RE in a panel data regression. As reported in the main regression results in Table IV.3, under both revenue share and expenditure share, the null of no variance across countries is rejected with Chi-squared statistics of 6167.78 and 6200.32 at 1 percent level of significance, respectively. Also, in Table 4, under both the revenue share and expenditure share, the null of no variance across countries is rejected with Chi-squared statistics of 2964.34 and 2943.75 at 1 percent level of significance respectively. This indicates that OLS is not efficient as alluded to in comparison with RE.

Choosing between the RE and FE estimators may be difficult, especially with respect to the time dimension of the data. The difference between the two estimators in estimating data with small T is large. However, the Hausman test (1978) can be used to select between the two estimators. This test is distributed as Chi-squared. The null hypothesis is that the individual component of the error term is not correlated with the regressors in which case FE will be efficient under both the null and the alternative hypotheses. On the other hand, RE will only be efficient under the null hypothesis. A large difference between the two estimators suggests that the RE estimator is not consistent. However, a challenge in the practical application of this test is that the covariance matrix may not be positive definite, thereby invalidating the test. From the main regression results in Table IV.3, under both the revenue share and expenditure share, we reject the null of no correlation between the individual error and regressors with Chi-squared statistics of 83.40 and 83.56 at 1 percent level of significance respectively. Also, in Table IV.4, under both revenue share and expenditure

share, we reject the null of no correlation between the individual error and regressors with Chi-squared statistics of 50.54 and 44.27 at 1 percent level of significance, respectively. Overall, the goodness-of-fit, the R-squared from the three estimators are incomparable, because of the differing strength of the estimators in using the within and between variances of the data efficiently.

4. Results

4.1 Empirical results

This section presents the results from the main regressions. The results are displayed in Tables IV.3 and IV.4. Table IV.3 displays the results of the effect of decentralisation as measured by both the revenue share and expenditure share on improved access to sanitation facilities. The results in columns 1 to 3 of Table IV.3 report the effect of decentralisation as measured by the revenue share on improved access to sanitation services. In contrast, the results in columns 4 to 6 report the effect of decentralisation as measured by the expenditure share on improved access to sanitation services. Before analysing coefficients of estimates, it would be proper to compare the estimators in terms of efficiency using some specification tests. The R-squared from the models cannot be used for comparison, for differing strength of the estimators in using information from within and between variances of the data. FE has the lowest root mean square error (RMSE) which indicates that the estimator is more efficient. This is confirmed with the Rho of 1.00, which implies that almost 100 percent of the variation is due to panel effects. While BP LM test does indicate there is a panel effect and ranks RE over OLS, the Hausman test chooses FE in line with the RMSE. Both the F statistic for OLS and FE, and Wald test for RE indicate the models are good with the rejection of the null at 1 percent level of significance. Given the results of the specification tests, this study will rely on the results from the FE estimator in the analysis of the results. FE is the most efficient estimator which has the merit of exploiting within country variation and helps in reducing the problem of omitted variable bias.

We will now focus on the FE estimates. The result in column 2, Table IV.3 suggests that decentralisation, as measured by revenue share, does improve access to sanitation services. *Lag revenue share* is positive and statistically significant as expected. The result from FE suggests that a 1 percentage point increase in decentralisation leads to an improvement of 0.12 percentage points in access to sanitation services. This implies that an increase in revenues of subnational governments may go into meeting the provision of sanitation services. The coefficient from OLS is negative, -0.2811. This may be attributed to the non-usage of the country-specific effects in the OLS model. Besides, the coefficient from the RE model (0.1064) is

close to that of the FE model (0.1165) probably because of our large *T*. This is a pointer that sticking to the FE model in this study is not inappropriate as FE correctly estimates the model.

One major determinant of public outputs is the level of wealth and the average income of any nation. It is thus not surprising that the *Log GDP per capita* is positive and statistically significant. A 1 percentage increase in income level per capita leads to an increase of 0.10 percentage points in improved access to sanitation services. This suggests that improved access to sanitation facilities would be high in high-income countries. Given the public investment required to meet the provision of improved access to sanitation facilities, the data for this study speaks to the situation in many high-income countries as they have achieved a high level of coverage of improved access to sanitation services. *Government size* is also positive and statistically significant. This suggests that the size of government is positively correlated with improved access to sanitation facilities. This indicates that the large size of government consumption expenditures may be due to spending on the basic public outputs. The variable *Log population density* is another driver of the provision of sanitation services. This suggests that the provision of sanitation services respond to the growth in the population density according to the *a priori* expectation.

Though the level of wealth is considered crucial for public outputs, institutional factors may be as important as the level of wealth. The quality and stability of public institutions are essential in raising the level of welfare, quality, and the availability of public services. Thus, *Democratic accountability* is a major institutional factor which indicates the responsiveness of government. It is not a surprise that the variable is positive and statistically significant. A responsive government will provide public goods and services that are essential to the people in the right quantity and quality. The coefficient of *Democratic accountability* from all the estimators further lends credence to the efficiency of FE. The coefficient is negative under OLS, while the coefficient of RE is closed to that of FE. All other variables: *Bureaucratic quality*, *Globalisation*, *Political competition*, *Internal conflict*, and the interaction term, are not statistically significant.

The result in column 5 of Table IV.3 describes the positive impact of decentralisation as measured by expenditure share on improved access to sanitation facilities. The *Lag expenditure share* is positive and statistically significant. This suggests that a 1 percentage point increase in decentralisation leads to a rise of 0.11 percentage points in improved access to sanitation. Besides, *Globalisation* also explains improved access to sanitation services. This is a significant driver of the MDGs. The coefficient is positive and marginally statistically significant. The goal of the UN and its agencies in monitoring the quality and quantity of sanitation facilities is to ensure that certain minimum quality and quantity that dignify humans are met in every nation. The behaviour of all other variables is as discussed under the revenue share in terms of

improved access to sanitation facilities. The interaction term is not statistically significant; likewise, the margin plots show the effect is indiscernible as the confidence intervals associated with the two groups overlap across values on the horizontal axis (Figure IV.2 p. 102). As mentioned earlier, the focus is on the result from the FE estimator as specification tests point at the efficiency of FE over all other estimators.

Table IV.3: Effect of decentralisation on improved access to sanitation for all countries

Variable	Revenue share			Expenditure share		
	OLS	FE	RE	OLS	FE	RE
Lag revenue share	-0.2811***	0.1165***	0.1064***			
	(0.0955)	(0.0343)	(0.0344)			
Lag expenditure share				-0.2947***	0.1065***	0.0854**
				(0.0986)	(0.0372)	(0.0379)
Government size	0.5041**	0.2794***	0.3550***	0.5085**	0.2874***	0.3616***
	(0.1916)	(0.0976)	(0.0878)	(0.1953)	(0.0948)	(0.0852)
Log GDP per capita	8.8940***	9.6252***	8.5487***	9.2678***	9.0562***	8.0791***
	(2.5898)	(2.3844)	(2.1650)	(2.6090)	(2.3666)	(2.1597)
Log pop. density	0.5690	16.1601***	6.7156***	0.4956	16.1943***	6.5620***
	(1.1046)	(4.8360)	(2.0562)	(1.1228)	(4.9022)	(2.0654)
Bureaucratic quality	-1.6818	0.3367	0.3069	-1.6897	0.4255	0.3589
	(2.2996)	(0.5455)	(0.6373)	(2.2279)	(0.5638)	(0.6772)
Democratic acct.	-2.1443**	0.9047***	0.8625***	-2.2376**	0.9923***	0.9398***
	(1.0061)	(0.2611)	(0.3044)	(1.0061)	(0.2621)	(0.3063)
Globalisation	0.2815	0.0978	0.0953	0.2748	0.1143*	0.1101*
	(0.1798)	(0.0630)	(0.0626)	(0.1794)	(0.0636)	(0.0630)
Political competition	-6.8941	-2.8950	-2.6578	-5.7634	-2.3775	-2.3197
	(6.0480)	(2.8079)	(2.9443)	(5.5173)	(2.4787)	(2.6278)
Internal conflict	1.9545***	-0.0663	0.0704	2.0472***	-0.0897	0.0595
	(0.6704)	(0.1417)	(0.1462)	(0.6808)	(0.1484)	(0.1514)
CompetitionXrevshare	0.4691**	-0.0032	-0.0226			
	(0.2042)	(0.1440)	(0.1395)			
CompetitionXexpshare				0.4787**	-0.0560	-0.0668
				(0.2028)	(0.1546)	(0.1516)
Observation	1,022	1,022	1,022	1,023	1,023	1,023
R^2	0.72	0.68	0.41	0.72	0.67	0.41
RMSE	8.93	1.39	1.54	8.90	1.41	1.56
Rho		1.00	0.98		1.00	0.98
F Test	8.70***	8.56***		9.22***	8.75***	
Wald (Chi2)			198.44***			196.87***
Hausman Test		83.40***			83.56***	
BP LM Test			6167.78***			6200.32***

Significance levels: *: 10%, **: 5%, ***: 1%. Clustered robust standard errors at the country level in parentheses. The dependent variable is the improved access to sanitation. Results in columns 1 to 3 are based on a year lag of revenue share as a measure of decentralisation; while, results in columns 4 to 6 are based on a year lag of expenditure share as a measure of decentralisation. All measures are indicated above the estimators. Log pop. density refers to log population density. Democratic acct. means democratic accountability. The interaction terms are political competition multiplied by revenue share and expenditure share respectively. RMSE means root mean square error; while BP LM test implies Breusch-Pagan Lagrangian Multiplier test. F test indicates the overall significance of the model with the null hypothesis that a model with no independent variable fits the data better. Wald (Chi2) is also a test of overall significance applied to the RE model with a null hypothesis that the regressors are all zero. The year effects are dummies included in all the estimators to capture the variation over the years. The year fixed effects are not statistically significant under OLS estimator in columns 1 and 4 using postestimation command of *testparm* (StataCorp, 2017). The number of countries included in the models is 66. Source: Author's computation.

Table IV.4: Effect of decentralisation on improved access to water for all countries

Variable	Revenue share			Expenditure share		
	OLS	FE	RE	OLS	FE	RE
Lag revenue share	-0.0112	0.1561***	0.1301***			
	(0.0318)	(0.0524)	(0.0463)			
Lag expenditure share				-0.0138	0.1280**	0.0905*
				(0.0313)	(0.0508)	(0.0475)
Government size	0.2986***	0.1183	0.1078	0.2946***	0.1212	0.1126
	(0.0925)	(0.0890)	(0.1126)	(0.0917)	(0.0912)	(0.1173)
Log GDP per capita	3.5453***	6.7027***	3.5404***	3.4943***	6.3386***	3.2962**
	(0.8950)	(2.2265)	(1.3555)	(0.8786)	(2.2707)	(1.4074)
Log pop. density	0.8855	7.3447	1.8011**	0.8821	7.9109	1.7319*
	(0.6001)	(5.5104)	(0.8655)	(0.6019)	(5.6698)	(0.8903)
Bureaucratic quality	-0.7262	0.0193	-0.2177	-0.7187	0.1153	-0.1737
	(0.7909)	(0.3837)	(0.4361)	(0.7892)	(0.4713)	(0.5227)
Democratic acct.	-0.5196	0.8114***	0.7402**	-0.4823	0.9184***	0.8243***
	(0.4017)	(0.2805)	(0.2954)	(0.4034)	(0.2919)	(0.3087)
Globalisation	0.0749	0.1417**	0.1487**	0.0801	0.1603**	0.1627**
	(0.0720)	(0.0697)	(0.0701)	(0.0723)	(0.0755)	(0.0753)
Political competition	-6.2556**	-1.1776	-0.5455	-6.1638**	-1.4201	-1.0856
	(3.0337)	(1.9940)	(2.0700)	(2.7997)	(1.8251)	(1.9655)
Internal conflict	0.4437	-0.3026*	-0.1879	0.4411	-0.3257*	-0.1899
	(0.3704)	(0.1754)	(0.2011)	(0.3759)	(0.1882)	(0.2121)
CompetitionXrevshare	0.2094**	0.0195	-0.0320			
	(0.1003)	(0.1096)	(0.0934)			
CompetitionXexpshare				0.2360**	0.0216	-0.0156
				(0.1009)	(0.1166)	(0.1035)
Observation	1,033	1,033	1,033	1,034	1,034	1,034
R^2	0.67	0.61	0.49	0.67	0.59	0.50
RMSE	4.09	1.31	1.45	4.09	1.35	1.49
Rho		0.99	0.89		0.99	0.89
F Test	10.16***	8.96***		10.20***	8.13***	
Wald (Chi2)			353.43***			301.51***
Hausman Test		50.54***			44.27***	
BP LM Test			2964.34***			2943.75***

Significance levels: *: 10%, **: 5%, ***: 1%. Clustered robust standard errors at the country level in parentheses. The dependent variable is the improved access to water. Results in columns 1 to 3 are based on a year lag of revenue share as a measure of decentralisation; while, results in columns 4 to 6 are based on a year lag of expenditure share as a measure of decentralisation. All measures indicated above the estimators. Log pop. density refers to log population density. Democratic acct. means democratic accountability. The interaction terms are political competition multiplied by revenue share and expenditure share respectively. RMSE means root mean square error; while BP LM test implies Breusch-Pagan Lagrangian Multiplier test. F test indicates the overall significance of the model with the null hypothesis that a model with no independent variable fits the data better. Wald (Chi2) is also a test of overall significance applied to the RE model with a null hypothesis that the regressors are all zero. The year effects are dummies included in all the estimators to capture the variation over the years. The year fixed effects are not statistically significant under OLS estimator in column 4 using postestimation command of *testparm* (StataCorp, 2017). The number of countries included in the models is 67. Source: Author's computation.

Table IV.4 displays results for the effect of decentralisation as measured by revenue share and expenditure share on improved access to water provision. The results in columns 1 to 3 of Table IV.4 report the effect of decentralisation as measured by revenue share on improved access to water provision, while the results in columns 4 to 6 report the effect of decentralisation as measured by expenditure share on improved access to water provision. As earlier argued under this section, the focus will be on the results from the FE

estimator. The specification and diagnostic tests indicate that the FE estimator is efficient in estimating the model for this study. Specifically, the results from both the RMSE and Hausman test suggest that FE estimator is efficient in estimating our model. The FE estimator has the merit of exploiting within country variation over time and helps in reducing the problem of omitted variable bias. The result in column 2 suggests that decentralisation, as measured by revenue share, does have a positive impact on improved access to water provision. The coefficient of the *Lag revenue share* is positive and statistically significant under FE and RE. The coefficient of the RE estimator is close to the coefficient of FE, probably due to our large *T*. Though, the result of RE estimator is not efficiently estimated. The negative coefficient of OLS may be attributed to the non-usage of country-specific information. The result in column 2 of Table IV.4 suggests that a 1 percentage point rise in decentralisation leads to an increase of 0.16 percentage points in improved access to water services. It is noteworthy to point out that this effect is larger than the effect of decentralisation on improved access to sanitation facilities.

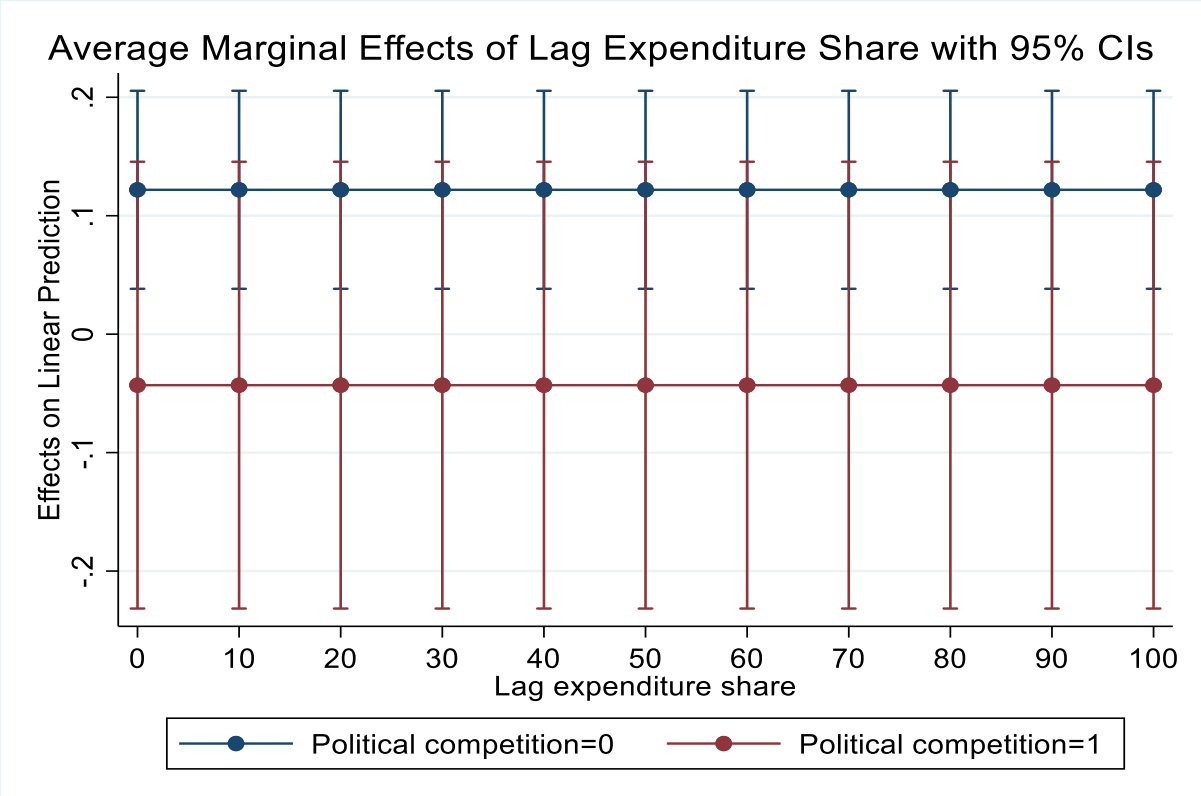
The effect of *Government size* on improved access to water is not statistically significant under the FE in column 2 of Table IV.4 unlike under the impact of decentralisation as measured by revenue share on improved access to sanitation services. *Log GDP per capita* does contribute to improved access to water provision. The variable is positively and statistically correlated with improved access to water provision. A 1 percentage increase in income level per capita leads to a rise of 0.07 percentage points in improved access to water provision. The level of wealth and average income in a nation is a significant determinant of improved access to water provision. The sign of the associated coefficients with both *Log population density* and *Bureaucratic quality* is positive, but the coefficients are not statistically significant. An essential institutional factor is positively correlated with improved access to water services. The coefficient of *Democratic accountability* is positive and statistically significant. The responsiveness of government is relevant to improved access to water just like improved access to sanitation. The coefficient of globalisation is positive and statistically significant, which implies improved access to water responds to the level of globalisation. This can be linked with the universal declaration of targets for the MDGs of the UN.

The coefficient of *Political competition* is negative, but it is not statistically significant. This implies that the effect would be positive in those countries where political competition exists in the polity. As expected, the impact of internal conflict on improved access to water is negative. The coefficient of internal conflict is negative and statistically significant as expected. In the absence of peace, there can be no progress. This extends to the provision of basic services for human existence such as water. The coefficient of the interaction term is positive, but it is not statistically significant. The margin plots for the interaction term

show the effect is not discernible as the confidence intervals associated with the two groups, the blue and red lines overlap across values on the horizontal axis (Figure IV.3 p. 103).

Now, the focus is on the impact of decentralisation as measured by expenditure share on improved access to water. Just like under the revenue share, the focus on the result from the FE estimator will be maintained. The result in column 5 of Table IV.4 points at a positive and statistically significant relationship between decentralisation as measured by expenditure share and improved access to water provision. The result of the *Lag expenditure share* under the FE suggests that a 1 percentage point increase in expenditure share leads to a rise of 0.13 percentage points in improved access to water. The behaviour of the variables under the expenditure share is similar to the behaviour of the variables under the revenue share for improved access to water provision. In magnitude and direction, the variables behave the same way under both the revenue share and expenditure as the results from columns 2 and 5 of Table IV.4 indicate.[75]

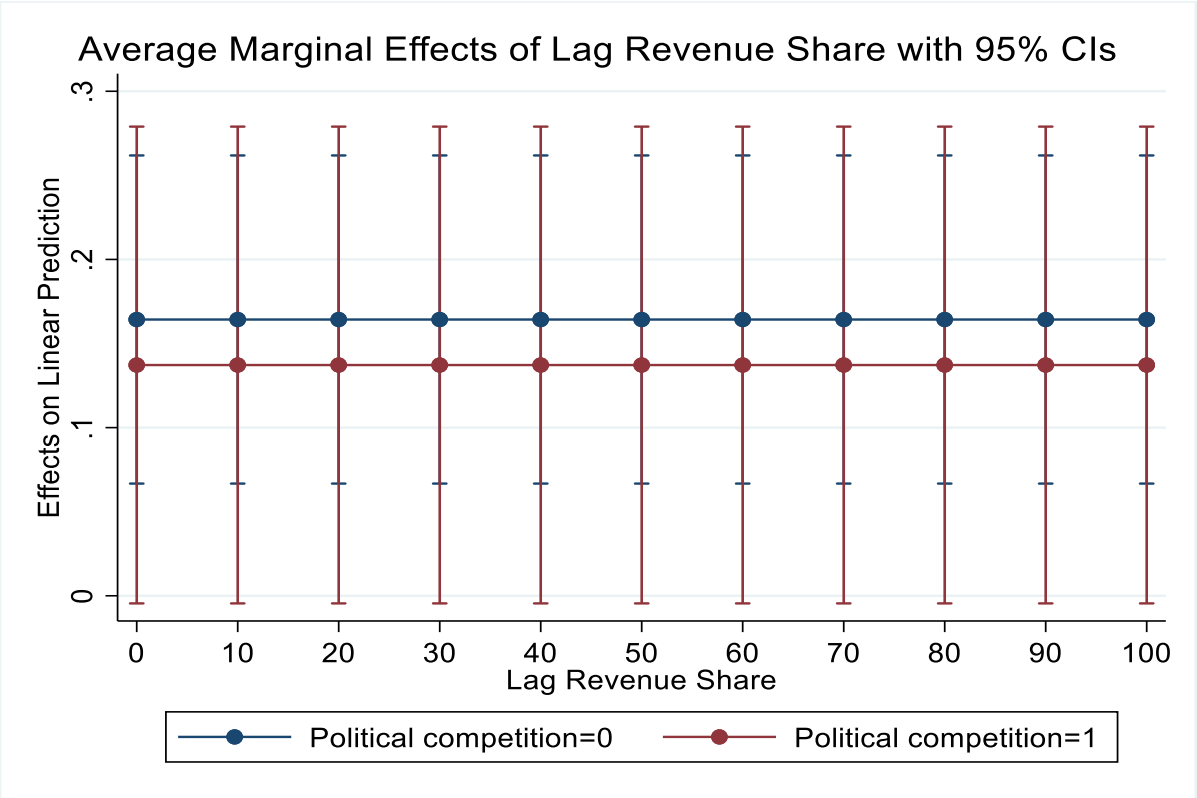
Figure IV.2: Margin plots of lag expenditure share and political competition (column 5, Table IV.3)



Source: Author's computation.

[75] For FE models reported in Table IV.3 and IV.4, the interaction terms were removed to see the effect on *Political competition* and other coefficients in the models. For the effect of decentralisation on improved access to sanitation facilities under both the revenue share and expenditure share, the variable *Political competition* is negative and statistically significant. On the other hand, there is no significant change in the magnitude of the other covariates. But for the effect of decentralisation on improved access to water under both revenue share and expenditure share, the variable *Political competition* is negative, but it is not statistically significant. These results are not reported here.

Figure IV.3: Margin plots of lag revenue share and political competition (column 2, Table IV.4)



Source: Author's computation.

4.2 Robustness checks

The reason for robustness checks is to confirm the consistency of the econometric estimates of this study. The data for the dependent variable improved access to sanitation facilities and water sources measured in percentage of the total population with improved access is the aggregated data for both urban and rural areas in a country. The data is available in disaggregated form. There is data for both rural and urban areas in every country assessed by agencies of the UN saddled with the data collection on improved access to sanitation facilities and water sources. The goal of decentralisation is to accelerate development, tailor public outputs towards local needs and bring governance closer to the governed (Oates, 1972,1999). Oates (2002) and Dinan, Cropper and Portney (1999) have maintained that there are welfare losses in the imposition of a uniform standard in water provision since there is an influence of environmental factors in water quality. Considering the above-stated views, it becomes quite compelling to use the disaggregated data of rural areas for improved access to sanitation facilities and water sources measured in percentage of the rural population with improved access to check the robustness of our econometric estimates.

The robustness check is conducted to check if decentralisation has any impact on improved access to sanitation and water services in rural areas. Decentralisation is expected to bring governance closer to the governed with improvement in public services. In many developing countries, governance is hardly noticed in rural areas, as many rural areas are without basic amenities (Zewari *et al.*, 2011). The results from the robustness checks where the dependent variable is improved access to sanitation facilities and water sources measured in the percentage of the rural population with improved access are similar to results for the main regression estimates in Tables IV.3 and IV.4. The results from the robustness checks are shown in Tables IV.5 and IV.6. As in the main regressions, the focus is on the results from the FE estimator because it is the most efficient among the estimators. The results in Tables IV.5 and IV.6 suggest that decentralisation, as measured by revenue share and expenditure share, has a positive impact on improved access to sanitation and water services in rural areas.

Both *Lag revenue share* and *Lag expenditure share* are positive and statistically significant. More so, the coefficients are larger than the coefficients of measures of decentralisation under the main results in Table IV.3 and IV.4. This yields a shred of compelling evidence in favour of the decentralised governance architecture in meeting demands for the provision of these essential services, namely water and sanitation in rural areas. The results from the econometric estimation indicate that the behaviour of the variables is similar in magnitude and direction as in the main regression estimates. In all, the results of robustness checks suggest decentralisation correlates positively with improved access to sanitation and water services. However, political competition is not statistically significant under the FE estimator across measures of decentralisation. The effect of the interaction term is also not distinguishable across measures of decentralisation for the FE estimates under the main regressions and robustness checks. Even so, attempts are made to distinguish the effect through margin plots. The margin plots show the confidence intervals for the two groups of politically competitive and non-politically competitive countries overlap across values of measures of decentralisation on the horizontal axis.[76]

[76] Theoretically, the regression estimates are adequate to identify the effects of interaction terms in linear models. But we choose to go the extra mile to identify the effect of the interaction terms in our models through margin plots. The information provided by the margin plots is not different from the estimates of our regressions concerning either the effect of revenue/expenditure share on the two states of competition or the effect of competition for different values of revenue/expenditure share (not shown here). We only show two of the margin plots (see pages 102-103).

Table IV.5: Effect of decentralisation on improved access to sanitation in rural areas

Variable	Revenue share			Expenditure share		
	OLS	FE	RE	OLS	FE	RE
Lag revenue share	-0.3298***	0.1368***	0.1162**			
	(0.1119)	(0.0506)	(0.0473)			
Lag expenditure share				-0.3487***	0.1487**	0.1113*
				(0.1137)	(0.0655)	(0.0597)
Government size	0.8316***	0.4668***	0.5525***	0.8343***	0.4857***	0.5650***
	(0.2811)	(0.1510)	(0.1335)	(0.2836)	(0.1489)	(0.1320)
Log GDP per capita	9.0832***	13.0003***	11.2218***	9.4156***	12.6659***	10.9049***
	(3.0237)	(3.4508)	(2.4604)	(3.0219)	(3.4768)	(2.4798)
Log pop. density	2.1656	18.9579**	7.3374***	2.0699	19.2133**	7.3792***
	(1.4252)	(7.6078)	(2.7262)	(1.4329)	(7.5705)	(2.7678)
Bureaucratic quality	1.3134	1.0413	0.9705	1.3061	1.2050	1.0737
	(2.8899)	(1.1045)	(1.1647)	(2.8405)	(1.1324)	(1.2044)
Democratic acct.	-3.0218**	1.2457***	1.1653**	-3.0616**	1.3377***	1.2436***
	(1.4125)	(0.4168)	(0.4596)	(1.4101)	(0.4160)	(0.4603)
Globalisation	0.4291*	0.1846*	0.1842*	0.4294*	0.2012*	0.1987*
	(0.2445)	(0.1044)	(0.1031)	(0.2439)	(0.1040)	(0.1031)
Political competition	-5.6845	-2.0383	-1.8259	-5.1052	-1.7431	-1.7161
	(8.2049)	(3.1211)	(2.9309)	(7.3532)	(2.6303)	(2.6088)
Internal conflict	3.0081***	-0.1874	0.0054	3.0941***	-0.2300	-0.0200
	(0.9029)	(0.2351)	(0.2444)	(0.9074)	(0.2385)	(0.2484)
CompetitionXrevshare	0.6886**	-0.0242	-0.0357			
	(0.3241)	(0.1969)	(0.1833)			
CompetitionXexpshare				0.7556**	-0.0604	-0.0621
				(0.3314)	(0.1991)	(0.1950)
Observation	1,022	1,022	1,022	1,023	1,023	1,023
R^2	0.73	0.62	0.49	0.73	0.62	0.49
RMSE	12.26	2.32	2.51	12.20	2.32	2.51
Rho		0.99	0.96		0.99	0.96
F Test	13.12***	15.79***		12.80***	23.81***	
Wald (Chi2)			419.63***			371.02***
Hausman Test		61.60***			62.11***	
BP LM Test			5667.86***			5676.66***

Significance levels: *: 10%, **: 5%, ***: 1%. Clustered robust standard errors at the country level in parentheses. The dependent variable is the improved access to sanitation measured in percentage of rural population with improved access to sanitation. Results in columns 1 to 3 are based on a year lag of revenue share as a measure of decentralisation; while, results in columns 4 to 6 are based on a year lag of expenditure share as a measure of decentralisation. All measures are indicated above the estimators. Log pop. density refers to log population density. Democratic acct. means democratic accountability. The interaction terms are political competition multiplied by revenue share and expenditure share respectively. RMSE means root mean square error; while BP LM test implies Breusch-Pagan Lagrangian Multiplier test. F test indicates the overall significance of the model with the null hypothesis that a model with no independent variable fits the data better. Wald (Chi2) is also a test of overall significance applied to the RE model with a null hypothesis that the regressors are all zero. The year effects are dummies included in all the estimators to capture the variation over the years. The number of countries included in the models is 66. Source: Author's computation.

Table IV.6: Effect of decentralisation on improved access to water in rural areas

Variable	Revenue share			Expenditure share		
	OLS	FE	RE	OLS	FE	RE
Lag revenue share	-0.0237	0.2714***	0.2048***			
	(0.0601)	(0.0840)	(0.0723)			
Lag expenditure share				-0.0207	0.2524***	0.1659**
				(0.0615)	(0.0943)	(0.0805)
Government size	0.6388***	0.1851	0.1403	0.6301***	0.1979	0.1510
	(0.1881)	(0.1760)	(0.2153)	(0.1855)	(0.1771)	(0.2198)
Log GDP per capita	3.8920**	10.1179***	4.6498**	3.7680**	10.0165***	4.3240**
	(1.6091)	(3.1489)	(1.8621)	(1.6077)	(3.2383)	(1.9485)
Log pop. density	2.3527**	7.8083	2.9487**	2.3724**	9.5026	2.9613**
	(0.9268)	(9.7161)	(1.2715)	(0.9370)	(9.8787)	(1.3018)
Bureaucratic quality	0.9370	1.4120	0.9201	0.9066	1.6869	1.0823
	(1.2840)	(1.0001)	(0.9841)	(1.2750)	(1.1109)	(1.0758)
Democratic acct.	-0.9666	1.4902***	1.3309***	-0.8762	1.6621***	1.4599***
	(0.8421)	(0.4333)	(0.4428)	(0.8337)	(0.4506)	(0.4632)
Globalisation	0.1815	0.2598**	0.2811**	0.1931	0.2857**	0.2994**
	(0.1439)	(0.1284)	(0.1357)	(0.1440)	(0.1382)	(0.1439)
Political competition	-9.0451	0.3202	0.7265	-9.3158	-0.7117	-0.4160
	(6.2527)	(2.9989)	(2.5297)	(5.9181)	(2.2754)	(2.3079)
Internal conflict	1.3447**	-0.5105*	-0.3164	1.3341*	-0.5710*	-0.3321
	(0.6696)	(0.2923)	(0.3525)	(0.6745)	(0.3157)	(0.3703)
CompetitionXrevshare	0.4095**	0.0148	-0.0328			
	(0.1890)	(0.1782)	(0.1427)			
CompetitionXexpshare				0.4796**	0.0690	0.0222
				(0.2020)	(0.1687)	(0.1599)
Observation	1,033	1,033	1,033	1,034	1,034	1,034
R^2	0.69	0.57	0.49	0.69	0.56	0.50
RMSE	7.51	2.57	2.82	7.48	2.61	2.86
Rho		0.97	0.86		0.97	0.86
F Test	7.34***	8.81***		7.72***	12.53***	
Wald (Chi2)			404.97***			373.53***
Hausman Test		72.44***			65.98***	
BP LM Test			4003.18***			3991.42***

Significance levels: *: 10%, **: 5%, ***: 1%. Clustered robust standard errors at the country level in parentheses. The dependent variable is the improved access to water measured in percentage of rural population with improved access to water. Results in columns 1 to 3 are based on a year lag of revenue share as a measure of decentralisation; while, results in columns 4 to 6 are based on a year lag of expenditure share as a measure of decentralisation. All measures indicated above the estimators. Log pop. density refers to log population density. Democratic acct. means democratic accountability. The interaction terms are political competition multiplied by revenue share and expenditure share respectively. RMSE means root mean square error; while BP LM test implies Breusch-Pagan Lagrangian Multiplier test. F test indicates the overall significance of the model with the null hypothesis that a model with no independent variable fits the data better. Wald (Chi2) is also a test of overall significance applied to the RE model with a null hypothesis that the regressors are all zero. The year effects are dummies included in all the estimators to capture the variation over the years. The number of countries included in the models is 67. Source: Author's computation.

5. Conclusion

This study examines the impact of decentralisation on improved access to sanitation and water services. The decentralised governance architecture promises an efficient delivery of public goods where it engenders healthy competition among various levels of government, particularly at the horizontal level. The primary

gain of decentralisation is in bringing governance close to the governed, especially at the local government level. Given this fact, governments at the local level may be better positioned to make proper service delivery to the people. This is the kernel of decentralisation theorem (Oates 1972, 1999). Decentralisation may be better in addressing the problems of unavailability and unimproved drinking water and poor sanitation at the subnational level in any country. The decentralised governance mechanism takes into consideration the heterogeneity of interests in any geopolitical setting. As such, this system encourages bottom-up approaches to addressing developmental challenges by giving recognition to the environmental realities. This is subsumed in what decentralisation holds for improved access to sanitation and water provision. More so, that environmental conditions influence the quality of drinking water and sewerage management implies decentralised approach may help greatly in resolving the challenges hindering the provision of these services as services should suit the circumstances of each jurisdiction. This is in line with the views expressed by Oates (2002) and Dina, Cropper and Portney (1999).

Under a "market-preserving" decentralisation, various jurisdictions will strive to improve the provision of drinking water and sanitation services given the significant knock-on effects of these essential services. The aforesaid subsumes a healthy decentralised arrangement in terms of the degree of decentralisation and revenue sharing. Also, the level of autonomy of subnational governments in setting tax rates and raising own revenues is vital for a robust multi-level government. This is important in terms of program choice and provision of services considering transfers from other governments and own revenues. It is noteworthy that institutional factors matter in meeting the demands for improved access to water and sanitation services. A responsive government will work hard to improve access to sanitation and water services. As stated, in the absence of peace, no development can take place. This is true of improved access to sanitation and water services. Nations that are experiencing civil strife cannot meet the needs of the populations. Globalisation is also a significant driver of improved access to sanitation and water provision. This may have been driven by the United Nations' declaration and campaign to eliminate poor access to sanitation and water around the globe, especially in poor developing countries.

Decentralisation in many developing countries is bedevilled with many challenges, including corruption and local capture (Prud'homme, 1995; Reinikka & Svensson, 2004). The grants to subnational levels from the central government are sometimes cornered for selfish gains of the people at the local government. Furthermore, decentralisation is most times lopsided in developing countries (Prud'homme, 1995). Revenues tend to be shared in favour of the central government, while expenditures tend to be decentralised at the lower level. This may significantly influence the relationship between decentralisation and improved

access to sanitation and water services. As suggested by Ahmad *et al.* (2006), various instruments of decentralisation facing service providers at the local level may alter their incentives for the provision of services. Notwithstanding the challenges of decentralisation, it appears a better governance architecture in improving the provision of services at the local level. The effect of decentralisation is more substantial in the rural areas vis-à-vis the national level, as shown by the results of this study. The coefficients of measures of decentralisation are larger in Table IV.5 and IV.6 than in Table IV.3 and IV.4. By and large, the results from this study suggest improved access to sanitation and water provision is due to decentralisation.

Appendix A

Table IV.A1: Definitions and sources of data

Variable	Description	Sources
Improved sanitation	Improved sanitation facilities (% of population with access)	United Nations (UN) accessed through World Bank Development Indicators (WDI), 2016
Improved water	Improved water sources (% of population with access)	UN accessed through WDI, 2016
Revenue share	Subnational government share of revenues (as % of total government revenues)	Government Finance Statistics, International Monetary Fund (IMF), 2016 and Author's computation
Expenditure share	Subnational government share of expenditures (as % of total government expenditures)	GFS, IMF, 2016 and Author's computation
Government size	The ratio of general government final consumption expenditures (constant 2010 US$) to gross domestic product (GDP) multiply by 100	WDI, 2016 and author's computation
Log GDP per capita	Log of GDP per capita (constant 2010 US$)	WDI, 2016
Log population density	Log of the ratio of total population to the land area (in square kilometre) of a country.	WDI, 2016
Bureaucratic quality	Indicator of stability and bureaucratic quality denoting the risk of policy reversal. Very high quality = 4, very low quality = 0.	International Country Risk Guide (ICRG), 2018
Democratic accountability	Measure of responsiveness of the government to its people based on the prevailing democratic practice. Lowest risk = 6, highest risk = 1.	ICRG, 2018
Globalisation	2017 KOF index of globalisation	Dreher (2006)
Internal conflict	Assessment of countries' internal risk of political violence effect on governance. Very high risk = 0, very low risk = 4.	ICRG, 2018
Political competition	Polity2 score normalised to a dummy variable where it takes 0 for Polity2 score of between -10 to 0 and 1 for 1 to 10 (Aidt & Eterovic, 2011).	Polity IV: Regime authority characteristics and transitions datasets, Centre for Systemic Peace, 2015

Source: Author's compilation.

Table IV.A2: Summary statistics for the year 1991

Variable	Obs.	Mean	St. Dev	Min.	Max.
Improved sanitation	60	84.41	20.11	16.90	100
Improved water	64	91.15	11.7	53.40	100
Revenue share	33	28.57	14.24	1.01	60.36
Expenditure share	34	25.71	13.75	3.81	57.02
Government size	54	19.73	6.71	9.02	37.74
Log GDP per capita	62	9.04	1.24	6.32	11.14
Log population density	66	4.01	1.24	0.36	6.11
Bureaucratic quality	54	2.71	1.21	0	4
Democratic accountability	54	4.13	1.49	1.33	6
Globalisation	66	51.97	18.16	24.71	83.74
Internal conflict	54	8.77	2.82	1.92	12
Political competition	65	0.15	0.36	0	1

Notes: The data is sourced from UN, IMF, ICRG, WBI, Polity IV, and KOF index of globalisation. Obs. means observation. The Log GDP per capita is log of gross domestic product (GDP) per capita. Log pop. density refers to log population density. Democratic acct. means democratic accountability. Source: Author's computation.

Table IV.A3: Summary statistics for the year 2014

Variable	Obs.	Mean	St. Dev	Min.	Max.
Improved sanitation	67	90.31	12.90	39.50	100
Improved water	67	96.56	5.85	64.20	100
Revenue share	48	26.21	16.46	1.62	84.47
Expenditure share	48	23.79	16.01	2.32	76.61
Government size	66	17.16	4.30	7.62	26.48
Log GDP per capita	68	9.53	1.06	7.44	11.55
Log population density	68	4.23	1.21	0.63	6.25
Bureaucratic quality	68	2.71	0.99	1	4
Democratic accountability	68	4.89	1.34	1	6
Globalisation	68	73.49	11.57	52.38	92.84
Internal conflict	68	9.35	1.35	6.42	12
Political competition	68	0.10	0.31	0	1

Notes: The data is sourced from UN, IMF, ICRG, WBI, Polity IV, and KOF index of globalisation. Obs. means observation. The Log GDP per capita is log of gross domestic product (GDP) per capita. Log pop. density refers to log population density. Democratic acct. means democratic accountability. Source: Author's computation.

Chapter V: Conclusion

1. Conclusion

The gain of fiscal decentralisation rests on the design of the system of fiscal decentralisation. The design of fiscal decentralisation must be done such that issues such as political targeting, tax exporting, common pool problem, debt crisis, incomplete fiscal decentralisation, and moral hazard are reduced to the barest minimum. These common challenges in the system of fiscal decentralisation have been studied, and institutional mechanisms have been evolved to deal with them. Though these institutional mechanisms are still susceptible to circumvention, they are still capable of checking the problems associated with fiscal decentralisation, if properly implemented. The evolving situation in Nigeria indicates that the design of the fiscal decentralisation in the country is fraught with some peculiar challenges. This situation has motivated two studies on the Nigerian fiscal decentralisation system.

The study on the politics inherent in intergovernmental transfers reveals that the intergovernmental allocation in Nigeria is bedevilled with strategic and political considerations despite the institution of a formula-based intergovernmental allocation system under the control of an institutional body (Khemani, 2007). This is clearly at variance with the AMS perspective of equity and efficiency considerations for intergovernmental transfers. The intergovernmental allocation in Nigeria seems not to follow the equity consideration. The results from this study suggest that states under the control of the party controlling the federal power are favoured in intergovernmental transfers. Besides, intergovernmental transfers to states are increased towards election periods, while transfers to states whose governors face a term limit are reduced. Findings of this study indicate further that states with greater fiscal needs are not favoured in revenue allocation. These states include those having a high number of school-age children as well as states with weak capacity for own revenues. The oil-producing states are being treated specially in revenue sharing because of the oil resources in those states. Of course, this arises out of several years of agitation for resource control and the threat of secession.

On the effect of intergovernmental transfers on own revenue generation of subnational governments in Nigeria, the study reveals a near-total reliance on transfers from the central government. The subnational governments lower efforts for own revenues. This is in line with the theoretical postulation of Bradford and Oates (1971a, 1971b) that transfers amount to a tax reduction for the residents of subnational jurisdictions in a fiscally federal state. The issue of transfer dependency of subnational governments is a pointer to the inherent problems in the design of fiscal decentralisation in Nigeria. The challenge stems from the revenue allocation system in Nigeria. The arrangement of vertical revenue allocation in Nigeria favours the central

government, while the horizontal revenue allocation formula encourages the common pool problem. The horizontal revenue sharing ensures that equality determines 40 percent of revenues that a state gets in transfers regardless of its developmental needs and the rate of urbanisation. This system encourages tax exporting and debts. It does not motivate the subnational units to strive to be independent of the central government as dependence on transfers is in the range of 75 to 95 percent.

By way of policy recommendation, both the horizontal and vertical formulae of revenue allocation in Nigeria need to be reviewed. Some variables that encourage jurisdictional competition need to be incorporated into horizontal revenue sharing. Notwithstanding, more money should go to state with weak fiscal capacity and greater fiscal needs. The vertical revenue sharing formula needs to be reviewed in favour of subnational governments in Nigeria. The skewed revenue sharing formula might have been one of the reasons that political targeting and opportunism exist in intergovernmental transfers in Nigeria. And, by extension, the existing revenue-sharing arrangement might account for the low revenue efforts of subnational governments. In other words, the problem of incomplete decentralisation has snowballed into an issue that is threatening the Nigerian fiscal decentralisation arrangement. In addition to reviewing revenue sharing formula in favour of subnational governments, the central government must encourage states to raise their revenue generation effort. They must be encouraged to exploit the relevant revenue assignment laws to close the gap between their current revenues and what can be raised when they fully use all the available legal means of revenue-raising. Also, the variation of tax rates on taxes on which subnational governments share tax administration with the federal government within their jurisdictions should be encouraged. The current transfer dependency will slow down the nation's development. Besides, there is a need for transparency in both expenditures and revenues across levels of government in Nigeria.

The subnational governments must be made to face a hard budget constraint. The current soft budget constraint, which encourages frivolous borrowings by subnational governments in Nigeria, should be reviewed in a manner that weans them off debts from the commercial banks and other private lenders. The delay in tackling this challenge may lead to other problems such as bailouts and ultimately, government failure. The central government should strengthen the enforcement of the relevant provisions of the current *Fiscal Responsibility Act* (FRA) to encourage openness in fiscal policies and prevent the accumulation of debts. Besides, pertinent new laws should be introduced to discourage unnecessary borrowings by subnational governments. The central government should try to review laws regulating the access of states to the capital market. The federal government should put in place laws that limit the expected transfers and own revenues in a fiscal year to not more than 110 percent of transfers and own revenues of the average

of the two previous years. This will check the incessant and frivolous borrowings from the capital and money markets using budget laws as excuses. Lastly, the RMAFC must be insulated against political manipulations. The situation where the evolved formula by the institution is rejected does not speak well of its independent status. More so, politics makes it possible for the institution to be relegated to the background when the SCN ruled against the extant practice of revenue sharing in 2002. This should be seriously addressed to restore the institution to its rightful position.

The study (Chapter Four) that addresses the issue of the impact of decentralisation on access to sanitation and water services shows that fiscal decentralisation correlates with improved access to sanitation facilities and water provision. The kernel of decentralisation theory of Oates (1972, 1999) is that decentralisation will lead to more public outputs as a result of the efficiency gain that results from allowing different jurisdictions to provide their public goods and services. As a result of the environmental impact on the issue of water and sanitation services, it should not be unexpected that moving the provision of these services to subnational jurisdictions will result in improved services. Notwithstanding the influence of decentralisation, the wealth level and other institutional factors are crucial for improved access to sanitation facilities and water sources. The rich nations have all improved access to sanitation and water services in their countries. A democratic and responsive government will act to protect the public. Thus, these institutional qualities matter for the provision and access to improved sanitation and water services. As peace is a necessary condition for development, it appears internal conflicts will reduce efforts at improving access to sanitation facilities and water sources.

On the policy side, there must be a determined effort to improve access to sanitation and water services across the globe. Many diseases are linked to lack of drinkable water and access to sanitation facilities in the world, especially among the poor developing countries. According to the UN reports, there has been a significant improvement in the coverage of water and sanitation services around the globe. Though, the lack of access to water and sanitation services is still evident among the developing countries. Considering the health and economic impact of these services, the UN should continue to push policies that support and raise the level of coverage of access to sanitation facilities and water sources in developing countries. Understandably, improved access to water and sanitation was promoted with MDGs. Now, access to water and sanitation services has been redefined and incorporated into the SDGs. The UN should encourage developing nations to raise improvement in access to water and sanitation services by investing more at the household level, given that the household is the basic unit of development. In addition, the knock-on effects of water and sanitation services make these services worthy of public investment.

By and large, the study makes original contributions to the literature of fiscal decentralisation in many respects. The Nigerian environment is a fertile ground for testing many theories of fiscal decentralisation, but this has remained unexplored for quite a while. This study makes a significant contribution to the literature of political economy of the formula-based intergovernmental transfer system by being the first, to the best knowledge of the author, to empirically explore the issue of politics inherent in intergovernmental transfers in Nigeria. Though it is a common knowledge that the subnational governments are "exploiting the fiscal common" in Nigeria, this work is the first to put the issue to test empirically. Thus, it is not surprising that transfers lead to a lower tax effort by subnational governments in Nigeria.

However, the novel contribution in this study of Chapter Three is the instrument employed in the IV/2SLS estimator. This study uses fragmentation, the number of political units in a subnational jurisdiction as one of the instruments for transfers. It is deemed that the number of political and administrative units correlates with intergovernmental transfers. Politicians can behave tactically in allocating transfers, but not with own revenues of subnational governments. A battery of specification and diagnostic tests confirm the relevance of the instrument, though this may not be a valid instrument in studies for developed countries (Hatfield & Kosec, 2013; Baskaran, Field, & Schnellenbach, 2016). Chapter Four investigates the impact of decentralisation on access to sanitation and water services from a cross-country perspective. The study shows that it is not just the governance architecture of decentralisation that matters to improved access to water and sanitation services but also the state of the economy and institutions in place.

1.1 Limitations of the study

In carrying out empirical work of this nature, there must be some challenges. Therefore, this study is not an exception. The study is challenged by peculiar limitations in empirical work such as data, money, and time. The major challenge is the data. A lack of adequate information challenges both the location-specific studies on Nigeria and the cross-country study. This results in the use of a few proxies for the variables in the models for econometric estimation. Many developing countries, including Nigeria, are plagued with a lack of quality data. This affects the information used in the study of Nigeria. The quality of data limits the estimators that could be deployed for the research and the experiments that could be carried out. Where a survey or a field experiment could have been conducted to generate information for the study on Nigeria, the available financial resources could not support such an ambitious dream. Given our resource constraint, we use the available data to explore the system of fiscal decentralisation in place in Nigeria.

Besides, many countries do not report information on the activities of governments to the IMF's GFS database. For many countries, there is missing information for several years. This is not peculiar to the developing countries. Additionally, there is a problem of aggregation of the data. The data is aggregated over levels of government. This makes it difficult to have information on units within each level and efficiency in the use of government funds. The nature of data in the database sets limits on the information that could be obtained from the available data. The formulae that are generated to extract information on decentralisation respond to the available information. Also, aggregation plagues information on the measures of both improved access to water sources as a percentage of the total population and improved access to sanitation facilities as a percentage of the total population. While this reveals the situation at the level of aggregation or national level, the situation at various households is masked by aggregation. Moreover, there is a dearth of literature on the impact of decentralisation on water and sanitation services; most past studies are descriptive. This fact reflects in the literature review for the section on water and sanitation. By and large, the available information impacts on the econometric estimation strategy for this study.

1.2 Suggestions for future research

The limitations of this study give some insight into future research areas. The investment into data generation in Nigeria by the government through the National Bureau of Statistics (NBS) is a welcome development. Some data are becoming available for subnational governments. If these series are produced for some years, a retest of the model of politics inherent in intergovernmental transfers in Nigeria should be implemented. The same is recommended for the study on the impact of intergovernmental transfers on revenue efforts of subnational governments. In addition, there is a growing problem of debts among the subnational governments in Nigeria. It is pertinent to investigate how the problem of incomplete decentralisation which has reared its head through transfer dependency has contributed and promoted reckless borrowings among subnational governments in Nigeria. There is also a growing problem of regional inequality in Nigeria. This requires investigation to determine the contribution of intergovernmental transfers in Nigeria to the problem of regional inequality. Lastly, on the study in Chapter Four, it is suggested that an investigation of the relationship between decentralisation and investment in water and sanitation infrastructures as well as the quality of these services should be done. The current study's sample is dominated by high-income countries, a retest of the results of this study should be carried out when more developing countries report data on the GFS database.

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