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Fiscal Decentralization and Economic Growth in Nigeria: A Multivariate Co-Integration Approach

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Abstract. This paper examines the long run and causal relationship between fiscal decentralization and economic growth in Nigeria for the period 1970 to 2012 using time series data. Results from a multivariate VAR model provide evidence of long run relationship between fiscal decentralization and economic growth in Nigeria. The three measures of fiscal decentralization have a positive and significant relationship with economic growth, Granger Causality test reveals long run unidirectional link running from fiscal decentralization to economic growth. The study recommends the need for government to urgently address the constitutional issue of fiscal powers among the three tiers of government to further strengthen the fiscal base of the state and local governments and increase further the level of fiscal decentralization.

Keywords: Fiscal Decentralization, Economic Growth, Cointegration, Causality.

1. Introduction

Fiscal decentralization is the devolution of fiscal responsibilities by the federal government to sub national governments to enhance efficiency in public service delivery and thereby promote economic growth and development (Ewetan, 2011). It is essentially about the allocation of government resources and spending to the various tiers of government (Oates, 1972; Tanzi 1995). To enhance growth and development potentials developing countries have embraced the decentralization of public spending and revenue collection from central governments to sub national governments (Aigbokhan, 1999). Thus, the issues of tax jurisdictions, expenditure assignment and which tier of government can best deliver public service to accelerate economic growth and development continues to be the focus of active and extensive research (Iwayemi, 2013).

The pioneer works of Tiebout (1956), Musgrave (1989) and Oates (1972) kick started the literature on the nexus between fiscal decentralization and economic growth. Many industrialized federal countries like Canada, United States, Germany, Austrialia, and Brazil have developed elaborate forms of fiscal arrangement between the central and other levels of government to address the issues of tax jurisdictions, expenditure assignment and intergovernmental transfers (Ewetan, 2011; Anyanwu, 1999; Aigbokhan, 1999; Tella, 1999). In many developing countries fiscal decentralization is being embraced as a strategy for breaking the dominance of centralization of government fiscal operations to bring these countries unto a sustainable growth path (Oates, 1999, Ewetan, 2011).

The financial hegemony enjoyed by the federal government over the 36 states, a Federal Capital Territory and 774 local government areas is a product of long years of military rule and the centralized nature of the military hierarchical structure (Ewetan, 2011).

According to Iwayemi (2013) "The centralizing tendencies imposed on the nation's fiscal federalism by the 1999 Constitution, a legacy of military dictatorship still continue to generate contentious debate a decade and half later". The contentious debate has assumed violent dimensions and even arm struggle against the state by the Niger Delta militant and agitation for resource control.

Despite the widening appeal of fiscal decentralization, findings in the empirical literature are inconclusive on its impact on economic growth in Nigeria. While some studies revealed a positive relationship between fiscal decentralization and economic growth (Chete, 1998; Ewetan, 2011; Philip and Isah, 2012), others found a negative relationship between fiscal decentralization and economic growth in Nigeria (Aigbokhan, 1999; Philip and Isah, 2012). The contradiction in the empirical literature on Nigeria provides the motivation for a re-examination of the relationship between fiscal decentralization and economic growth in Nigeria. Also this study will examine the issue of causality between fiscal decentralization and economic growth which previous studies did not consider.

2. Theoretical Basis for Fiscal Federalism

The basic foundations for the initial theory of Fiscal Federalism were laid by Kenneth Arrow, Richard Musgrave and Paul Sadweh Samuelson. Samuelson's two important papers (1954, 1955) on the theory of public goods, Arrows discourse (1970) on the roles of the public and private sectors and Musgrave's book (1959) on public finance provided the framework for what became accepted as the proper role of the state in the economy.

Within this framework, three roles were identified for the government sector. These were the roles of government in correcting for various forms of market failure, ensuring

an equitable distribution of income and seeking to maintain stability in the macro-economy at full employment and stable prices. The theoretical framework in question was basically a Keynesian one which canvassed for an activist role of the state in economic affairs. Thus the government was expected to step in where the market mechanism failed due to various types of public goods characteristics. Economics teaches us that public goods will be under-provided if left to private market mechanism since the private provider would under invest in their provision because the benefits accruable to the provider would be far lower than the total benefit to society. Government and their officials were seen as the custodians of public interest who would seek to maximize social welfare based on their benevolence or need to ensure electoral success in democracies.

The assumption of a multi-level government setting in place, and the role of the state in maximizing social welfare provides the basic ingredients for the theory of fiscal federalism in which each tier of government seeks to maximize the social welfare of the citizens within its jurisdiction. This multi-layered quest becomes very important where public goods exists, the consumption of which is not national in character, but localized. In such circumstances, local outputs targeted at local demands by respective local jurisdictions clearly provide higher social welfare than central provision. This principle, which Oates (1972) formalized into the "Decentralization Theorem" constitutes the basic foundation referred to as the first generation theory of fiscal decentralization (Oates, 2006). The theory focuses on situations where different levels of government provide efficient levels of outputs of public goods "for those goods whose special patterns of benefits are encompassed by the geographical scope of jurisdictions" (Oates, 2006b). Such situation came to be known as "perfect mapping" or "fiscal equivalence" (Ma, 1995).

Nevertheless, it was also recognized that, given the multiplicity of local goods with varying geographical patterns of consumption, there was hardly any level of government that could produce a perfecting mapping for all public goods. Thus, it is recognized that there would be local public goods with inter-jurisdictional spill-overs. For example, a road may confer public goods characteristics, the benefits of which are enjoyed beyond the local jurisdiction. The local authority may then under-provide for such a good. To avoid this, the theory then resort to traditional Pigouvian subsidies, requiring the central government to provide matching grants to the lower level government so that it can internalize the full benefits.

Based on the following, the role of government in maximizing social welfare through public goods provision is assigned to the lower tiers of government. The other two roles of income distribution and stabilization are regarded as suitable for the central government. To understand the rationale for assignment of the redistribution function to the central government, there is the need to examine what the implications of assigning this responsibility to the lower tier would imply. Given that citizens are freely mobile across local or regional jurisdictions, a lower level jurisdiction that embarks on a programme of redistribution from the rich to the poor is faced with the out-migration of the rich to non-redistributing jurisdictions and in-migration of the poor from such jurisdictions to the redistributing one. If on the other hand, the powers to redistribute are vested in the central government, a redistribution policy would apply equally to citizens resident in all jurisdictions. There would therefore be no induced migration.

The assignment of the stabilization function also follows from the chaos that would ensue if sub-central governments are assigned the responsibility. Sub national policies will lead to sub-optimal policies from the point of view of national welfare. Moreover, given the openness that characterizes the relationship between the regional

governments, they are grossly constrained in carrying out effective stabilization policies. This is because these lower tiers of government have very limited capacity to influence local employment levels and inflation (Bonfim and Shah, 2007).

From the foregoing, the role assignment which flows from the basic theory of fiscal federalism is summarized as follows: The central government is expected to ensure equitable distribution of income, maintain macroeconomic stability and provide public goods that are national in character. Decentralized levels of government on the other hand are expected to concentrate on the provision of local public good with the central government providing targeted grants in cases where there are jurisdictional spill-overs associated with local public goods.

Once the assignment of roles had been carried out, the next step in the theoretical framework is to determine the appropriate taxing framework. In addressing this tax assignment problem, attention is paid to the need to avoid distortions resulting from decentralized taxation of mobile tax bases. Gordon (1983) emphasizes that the extensive application of non-benefit taxes on mobile factors at decentralized levels of government could result in distortions in the location of economic activity.

Following from the assignment of functions, taxes that matched more effectively the assigned functions are also assigned to the relevant tier or level of government. For example, progressive income tax is suited to the functions of income redistribution and macro-economic stabilization and is therefore assigned to the central government. On the other hand, property taxes and user fees were deemed more appropriate for local governments. Benefits taxes are also prescribed for decentralized government based on the conclusion that such taxes promote economic efficiency when dealing with mobile economic units, be they individual or firms (Olson, 1982).

The final element of this basic theory is the need for fiscal equalization. This is in the form of lump sum transfers from the central government to decentralized governments. The arguments for equalization are mainly two. The first which is on efficiency grounds sees equalization as a way of correcting for distorted migration patterns. The second is to provide assistance to poorer regions or jurisdictions. Equalization is important in a number of federations. For example, Canada has an elaborate equalization scheme built into her inter-governmental fiscal arrangements (Boadway and Hobson, 2009).

It necessary to point out that recent literature emphasizes the importance of reliance on own revenues for financing local budgets. A number of authors (Weingast, 1997; Mckinnon, 1997) draw attention to the dangers of decentralized levels of government relying too heavily on intergovernmental transfers for financing their budgets. These are lessons that Nigeria's fiscal system should draw from.

3. Review of Related Literature

While theoretically fiscal decentralization promotes economic growth via efficiency gains, empirical evidence is mixed and inconclusive. Oates (1999) finds a significant and robust positive correlation between fiscal decentralization and economic growth. Shahdani et al (2012) find a linear positive relationship between expenditure decentralization and economic growth, however revenue decentralization appears to have nonlinear positive effect on economic growth. Iimi (2005) using the instrument variables technique finds that fiscal decentralization has a significant positive impact on per capita GDP growth. Sakata (2002) finds robust evidence that fiscal decentralization contributes to economic growth in United States. Ismail and Hamzah (2006) using a production function based estimation framework and cross-section data for Indonesia find a positive and significant relationship between expenditure decentralization and

economic growth, and a negative insignificant relationship between revenue decentralization and economic growth.

Similarly Lin and Liu (2000) detect a positive impact of fiscal decentralization on China's overall growth rate attributed to efficiency improvements of resource allocation rather than higher investment drive. On the contrary Zhang and Zou (1998) find a significant and robust negative relationship between fiscal decentralization and China's provincial economic growth linked to decentralized key infrastructure projects with nation-wide externalities. The contrasting findings from these two studies on China show that fiscal decentralization induces diverse growth performance at the national and at the provincial level. Yilma (1999) finds a significant positive relationship between fiscal decentralization and per capita growth for unitary countries, while the results for federal countries are inconclusive. Zhang and Zou (1998) detect a positive effect of per capita fiscal decentralization shares on Indian regional economic growth, albeit the effect is only significant in the case of the capita revenue share.

Xie et al (1999) find for the US states that further decentralization in public spending may be harmful for growth. Davoodi and Zou (1998) using a panel data set of 46 countries find a non-significant negative relationship between fiscal decentralization and economic growth in developing countries, but none in developed countries. Similarly Woller and Phillips (1998) find no significant and robust relationship in LDCs but detected a weak relationship between the revenue share and growth..

The findings in the empirical literature on the nature of the relationship between fiscal decentralization and economic growth in Nigeria are mixed and inconclusive. Ewetan (2011) using time series data in a study on Nigeria from 1970 to 2007 finds that fiscal decentralization has a significant positive impact on economic growth. Philip and Isah

(2012) used three different measures of decentralization in their study on Nigeria. They find a non-significant positive relationship between revenue decentralization and economic growth, and a significant negative relationship between expenditure decentralization and economic growth. On the contrary Aigbokhan (1999) finds a negative relationship between fiscal decentralization and economic growth. The contradictory findings in the empirical literature on Nigeria provides the motivation for this study to further re-examine the nature of the relationship between fiscal decentralization and economic growth in Nigeria.

4. Methodology, Model Specification and Data

Given the mixed results from previous studies in the literature the model used in this study is an extension from other studies (Ram, 1986 and Aigbokhan, 1996; 1999; Ewetan, 2011). The model assumes that the economy consists of two broad sectors, public (G) and private (P) whose output depends on labour (L) and capital (K). In addition, the output of G exercises some externality effect on output in P. The production function of the economy is thus:

$Y = f(L, K_P, K_G)$ ----------(1)

where the subscripts p and g denote the private and public sectoral inputs respectively. Total inputs are given as:

$L_T = L_P + L_G$----------(2)

$K_T = K_P + K_G$----------(3)

The production functions of the two sectors are thus:

$Y_P = P(L_P, K_P, G)$ ----------(4)

$Y_G = G(L_G, K_G)$ ----------(5)

Total output Y is given as the sum of sectoral output or a function of sectoral inputs:

$Y = Y_P + Y_G$, or ----------(6)

$Y = P(L_P, K_P, G) + G(L_G, K_G)$, or ----------(7)

$Y = L_T + K_T + G_T$)----------(8)

The model further assumes a federal state in which public spending is carried out by three levels of government: federal (f), state (s), and local (m). This fiscal arrangement is stated thus:

$Y = f + s + m$ ----------(9)

Introducing fiscal decentralization (FD) variable into the model to replace variable (G_T) equation 8 becomes:

$Y = L + K + FD$ ----------(10)

The size of G_T in equation 8 depends on the level of fiscal decentralization (FD) in equation 10. The structural form of the basic growth equation 10 takes the form:

$Y = \alpha_0 + \alpha_1 L_t + \alpha_2 K_t + \alpha_3 FD_t + \mu_t$ ----------(11)

Where α_0 is the constant term which incorporates the influence of technical on growth and μ_t is the error term.There is the need to find out other possible influence on the model. Government financial operations at all levels of governance contribute significantly to money supply which impacts on economic growth. Therefore equation (11) is re-specified with money supply (MS) as a determining factor.

$Y = \alpha_0 + \alpha_1 L_t + \alpha_2 K_t + \alpha_3 FD_t + \alpha_4 MS_t + \mu_t$ ----------(12)

Equation (12) is transformed to natural logarithms for the conventional statistical reasons:

$\log Y^i_t = \alpha_0 + \alpha_1 \log L_t + \alpha_2 \log K_t + \alpha_3 \log FD_t + \alpha_4 \log MS_t + \mu_t$ ----------(13)

The consensus in the literature is that an operational measure of decentralization is the share of decentralized expenditures and revenues of state and local governments in the nation's total fiscal activities (Ubogu, 1982). However the empirical literature contains different measures of decentralization. Zhang and Zou (1996) measure it as the ratio of total subnational spending to total central spending, while Ehdaie(1994) measures it as

the ratio of total subnational governments own-source revenues over total national(federal plus subnational) expenditures. This study employs three measures of fiscal decentralization; (i) subnational fiscal autonomy or revenue measure (FD_1); (ii) sub national spending share or expenditure measure (FD_2); (iii) and sub national dependency or simultaneity measure (FD_3) to determine the extent, and the impact of fiscal decentralization on economic growth in Nigeria over the study period 1970 to 2012. Other variables of the model are defined as follows; Y is real gross domestic product; L is the labour force; K is the stock of physical capital; MS is the money supply; α_0 is the constant term,'t' is the time trend, and 'μ' is the random error term.

4.1 Model Estimation Technique

In terms of econometric methodology, the multivariate cointegration approach offers useful insights towards testing for causal relationship. In principle, two or more variables are adjudged to be cointegrated when they share a common trend. Hence, the existence of cointegration implies that causality runs in at least one direction (Okodua and Ewetan, 2013; Akinlo and Egbetunde, 2010; Granger, 1988). However there could be exceptions to this expectation. The cointegration and error correction methodology is extensively used and well documented in the literature (Banerjee, et al. 1993; Johansen and Juselius, 1990; Johansen, 1988; Engle and Granger, 1987). Johansen (1988) multivariate cointegration model is based on the error correction representation given by:

$$\Delta X_t = \mu + \sum_{i=1}^{\rho-1} \tau_I \Delta X_{t-i} + \prod X_{t-1} + \varepsilon_t \text{----------(14)}$$

Where Xt is an (nx1) column vector of ϱ variables, μ is an (nx1) vector of constant terms, Γ and Π represent coefficient matrices, Δ is a difference operator, and ε_t−N(0,∑). The coefficient matrix Π is known as the impact matrix, and it contains information about

the long-run relationships. Johansen's methodology requires the estimation of the VAR equation (3.3) and the residuals are then used to compute two likelihood ratio (LR) test statistics that can be used in the determination of the unique cointegrating vectors of Xt. The cointegrating rank can be tested with two statistics, the trace test and the maximal eigenvalue test.

4.2 Vector Error Correction Model (VECM)

The error correction version pertaining to the five variables (Y, L, K, MS, FD) used in the study is stated below:

$$\Delta Y_t = \alpha_o + \sum_{i=0}^{n} \propto_{1t} \Delta Y_{t-1} + \sum_{i=0}^{n} \alpha_{2t} \Delta L_{t-1} + \sum_{i=0}^{n} \alpha_{3t} \Delta K_{t-1} + \sum_{i=0}^{n} \alpha_{4t} \Delta MS_{t-1} + \sum_{i=0}^{n} \alpha_{5t} \Delta FD_{t-1} \text{ -- (15)}$$

Where ECMt-1 is the error correction term and ε_t is the mutually uncorrelated white noise residual. The coefficient of the ECM variable contains information about whether the past values of variables affect the current values of the variable under study. The size and statistical significance of the coefficient of the error correction term in each ECM model measures the tendencies of each variable to return to the equilibrium. A significant coefficient implies that past equilibrium errors play a role in determining the current outcomes. The short run dynamics are captured through the individual coefficients of the difference terms. The short run dynamics are captured through the individual coefficients of the difference terms. Fiscal decentralization (FD) does not Granger cause economic growth (Y) if all α_2t=0, and Economic growth (Y) does not Granger cause fiscal decentralization (FD) if all β_(2t) = 0. According to Akinlo and Egbetunde (2010), and Mehra, (1994) these hypotheses can be tested using standard F statistics

4.3 Stationarity Tests

There is the possibility of co-integration when each variable is integrated of the same order d≥1. This necessary, but rarely sufficient, condition implies that the series share a common trend. Therefore to ascertain whether mean reversion is characteristic of each variable the paper used both Augmented Dickey-Fuller (ADF) test by Dickey and Fuller (1979, 1981), and Phillip-Perron (PP) test by Phillips (1987) and Phillips Perron (1988) to infer the stationarity properties of the study series. This is conducted, with intercept only and intercept and trend respectively, on the levels and first difference of the series.

4.4 Granger Causality Test

Granger causality tests are performed to find out the direction of the causal link between fiscal decentralization and economic growth. The Granger causality approach measures the precedence and information provided by a variable (X) in explaining the current value of another variable (Y). The basic rationale of Granger causality is that the change in fiscal decentralization Granger causes the change in economic growth if past values of the change in fiscal decentralization improve unbiased least-square predictions about the change in economic growth. The null hypothesis H0 tested is that X does not granger-cause Y and Y does not granger-cause X.

5.0 Empirical Results and Discussions

This section presents the results of the unit root, cointegration, vector error correction, and Granger causality tests conducted.

5.1 Stationarity Tests

To avoid spurious regression outcomes, the paper used both the Augments Dickey-Fuller and Phillip-Perron (PP) tests to find the existence of unit root in each of the time series. Table 1 summarizes the results of both the ADF and PP tests conducted with intercept only and intercept and trend respectively. A variable is stationary when the ADF and PP values are greater than the critical value (CV) at a given level (1%, 5%, and

10%, denoted as *, **, ***, respectively). Since all the variables were non stationary in levels they were all differenced once. Table 1 shows that all the variables were stationary after first differencing (that is, the variables are integrated of order one), meaning that the variables are I(1) series.

Table 1. Unit Root Test for Stationarity at First Difference

Variables	ADF (Intercept)	ADF (Intercept and Trend)	PP (Intercept)	PP (Intercept and Trend)
InY	4.372(-2.981)**	6.154(-4.324)*	- 7.432(-3.679)*	- 9.238(-4.324)*
InL	6.378(-3.744)*	6.122(-4.309)*	- 5.332(-3.689)*	- 7.223(-4.324)*
InK	- 4.664(-3.689)*	- 5.662(-4.324)*	- 4.795(-3.679)*	- 5.659(-4.309)*
InMS	- 5.298(-3.689)*	- 6.133(-4.324)*	- 9.546(-3.689)*	- 10.569(-4.324)*
$InFD_1$	- 4.788(-3.679)*	- 4.989(-4.309)*	- 4.762(-3.679)*	- 4.873(-4.309)*
$InFD_2$	- 5.198(-3.679)*	- 5.266(-4.324)*	- 5.396(-3.679)*	- 5.257(-4.309)*
$lnFD_3$	6.263((-3.679)*	5.795(-4.309)*	4.963(-3.679)*	4.638(-4.309)*

Note: *,** and*** indicate 1%, 5% and 10% significance respectively. Figures within parentheses indicate critical values.

Source: Author's Estimation using Eviews 7.0.

5.2 Cointegration Result

Having established that all the variables of the study are integrated of order one, the Johansen-Juselius approach described in the methodology is used to test for the existence of cointegration relationship among the variable series. Table 2 and 3report the cointegration test results for model 1, 2 and 3. The results confirm the existence of cointegration between the three measures of fiscal decentralization, economic growth, labour, real capita stock and money supply. The trace statistic and the maximum eigenvalue statistic reject the null hypothesis of no cointegration at 5 per cent level (0.05 level).

Table 2: Unrestricted Co-integration Rank Test (Trace)

Hypothesized No of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Probability
Model 1: FD_1 as a Measure of Fiscal Decentralization				
None*	0.845758	69.31624	45.75782	0.0003
At most 1	0.976677	22.47234	27.68945	0.2211
Model 2: FD_2 as a Measure of Fiscal Decentralization				
None*	0.766453	73.47724	45.75782	0.0001
At most 1	0.473667	23.23875	27.68945	0.1221
Model 3: FD_3 as a Measure of Fiscal Decentralization				
None*	0.737854	65.45231	45.75782	0.0012
At most 1	0.422975	22.27775	27.68945	0.1432

Trace test indicates 1 cointegratingeqn at the 0.05 level

*denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table 3: Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Probability
Model 1: FD_1 as a Measure of Fiscal Decentralization				
None*	0.845758	46.54328	25.67342	0.0003
At most 1	0.976677	19.15421	22.23145	0.0892
Model 2: FD_2 as a Measure of Fiscal Decentralization				
None*	0.766453	41.20346	25.67342	0.0002
At most 1	0.473667	16.45443	22.23145	0.1882
Model 3: FD_3 as a Measure of Fiscal Decentralization				
None*	0.737854	36.80813	25.67342	0.0019
At most 1	0.422975	14.83123	22.23145	0.3005

Trace test indicates 1 cointegratingeqn at the 0.05 level

*denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table 4: Long Run Normalized Cointegration Estimates

Normalized Cointegration Coefficients (standard error estimates)						
LnY	LnL	LnK	LnMS	$LnFD_1$	$LnFD_2$	$LnFD_3$
1.000000	-1.56721 (0.0462344)	0.0342125 (0.0252782)	-0.3215632 (0.0721532)	-0.1203265 (0.0213527)	-0.0324132 (0.0312673)	-0.0033642 (0.0154276)
	{-24.23}	{0.14}	{-4.13}	{3.24)	{4.52}	{3.75}
P>|z|	0.000	0.728	0.000	0.001	0.000	0.001

Note: Standard error and Z-Statistics are stated in parenthesis as () and {} respectively.

Source: Author's Estimation using Stata 10.0

Table 4 above shows the normalized cointegration coefficients of the variables in this study model. The results in the table are explained with respect to the signs and magnitude of the variables in the normalized cointegration result. The probability statistic (P>|z|) is used to determine whether or not a variable is significant at a 5% level. The null hypothesis states that the variable is not statistically different from zero and is thus insignificant while the alternative hypothesis states that the variable is statistically different from zero and is thus significant. With a P-value less than 0.05, the null hypothesis cannot be accepted that the variable is statistically different from zero and is thus significant. The coefficient of the variables shows if the independent variable has a positive or negative relationship with the dependent variable. The coefficient values of the three measures of fiscal decentralization (FD_1, FD_2, FD_3), labour force (L) and money supply (MS) have a positive and significant relationship with economic growth (Y) in accordance with a priori expectation at 0.05 level of significance, while the gross fixed capital formation (K) has a negative and insignificant relationship with economic growth at 0.05 level of significance which deviates from a priori expectation,

5.3. Error Correction Model

When cointegration exists, the Engle-Granger Theorem establishes the encompassing power of the ECM over other forms of dynamic specification (Akinlo and Egbetunde, 2010). The error correction term measures the speed of adjustment to restore equilibrium in the dynamic model. The error correction coefficient shows how quickly/slowly variables return to equilibrium and it should have a statistically significant coefficient with a negative sign. A highly significant error correction term is further proof of the existence of a stable long-term relationship (Bannerjee et al. 1993). Table 5 below shows that the error correction coefficient has the expected negative sign and lies between the usual range of 0 and 1. Precisely, this speed of adjustment is -0.41 suggesting that about 41 percent of errors generated in each period is automatically corrected by the system in the subsequent period and is statistically significant at 1 percent level.

Table 5: Error Correction Model 1

Dependent Variable ΔFD_1 Included observations; 29 after adjustments			
Variable	Coefficient	Std. Error	t-statistic
ECM_{t-1}	-0.413254*	0.31267	-2.84254
C	-171003.14	19023	-0.33626
$\Delta FD_1(-1)$	0.412172	0.27640	1.13366
$\Delta Y(-1)$	19.23562	18.8178	1.40058
$\Delta L(-1)$	14.432751	5.1489	0.89623
$\Delta K(-1)$	15.231424	3972.4	-0.50478
$\Delta MS(-1)$	32.42374	21.4528	1.57853
R-squared	0.424278	Mean dependent var.	
Adj. R-squared	0.263428	S.D. dependent var.	
F-statistic	3.212436	Akaike AIC	

Δ is the difference operator. *, stands for statistical significance at the 1% level.

Table 6 below shows that the error correction coefficient has the expected negative sign and lies between the usual range of 0 and 1. Precisely, this speed of adjustment is -0.33 suggesting that about 33 percent of errors generated in each period is automatically corrected by the system in the subsequent period and is statistically significant at 1 percent level.

Table 6: Error Correction Model 2

Dependent Variable ΔFD_2 Included observations; 29 after adjustments			
Variable	Coefficient	Std. Error	t-statistic
ECM_{t-1}	-0.312174*	0.04480	0.62051
C	75643.52	144753	-0.64423
$\Delta FD_2(-1)$	0.573852	0.23530	4.43863
$\Delta Y(-1)$	0.156486	7.43764	0.02945
$\Delta L(-1)$	-0.032341	5.27742	-0.01572
$\Delta K(-1)$	4284.246	21231.7	-0.85345
$\Delta MS(-1)$	7324.231	32162.6	0.63214
R-squared	0.693276	Mean dependent var.	
Adj. R-squared	0.583762	S.D. dependent var.	
F-statistic	8.534862	Akaike AIC	

Δ is the difference operator. *, stands for statistical significance at the 1% level.

Table 7 below shows that the error correction coefficient has the expected negative sign and lies between the usual range of 0 and 1. Precisely, this speed of adjustment is -0.52 suggesting that about 52 percent of errors generated in each period is automatically corrected by the system in the subsequent period and is statistically significant at 1 percent level.

Table 7: Error Correction Model 3

Dependent Variable ΔFD_3 Included observations; 29 after adjustments			
Variable	Coefficient	Std. Error	t-statistic
ECM_{t-1}	-0.524786	0.23645	-2.78872
C	938.276519	8.923	2.32463
$\Delta FD_3(-1)$	-0.353278	0.25475	-2.34943
$\Delta Y(-1)$	-3.561894	0.35875	-1.73875
$\Delta L(-1)$	-1.231594	7.15693	4.54841
$\Delta K(-1)$	8.241935	9.13479	3.67397
$\Delta MS(-1)$	9658.672	53245.9	0.72963
R-squared	0.376431	Mean dependent var	
Adj. R-squared	0.175233	S.D. dependent var.	
F-statistic	2.761578	Akaike AIC	

Δ is the difference operator. *, stands for statistical significance at the 1% level.

5.4 Granger Causality Result

In general, the cointegration result is supported by the results reported in Table 7which show the existence of causality between economic growth and the three measures of fiscal decentralization. There is unidirectional causality between economic growth and fiscal decentralization for the three measures of fiscal decentralization, with the causality running from fiscal decentralization to economic growth. The granger causality results further confirm the decentralization theorem that fiscal decentralization promotes economic growth because of the efficiency gains of public goods provision by sub national governments tailored to meet preferences of local citizens at that levels of government

Table 8: Pair-wise Granger Causality Tests

Null Hypothesis	Obs	F-statistic	Probability
LY does not Granger Cause LFD_1	29	7.41977	0.7534
LFD_1 does not Granger Cause LY	29	5.07363	0.0001
LY does not Granger Cause LFD_2	29	6.92229	0.6489
LFD_2 does not Granger Cause LY	29	0.04685	0.0010
LY does not Granger Cause LFD_3	29	8.20032	0.8974
LFD_3 does not Granger Cause LY	29	7.13853	0.0000

6.0 Conclusion and Policy Implications

This paper examines the long run and causal relationship between fiscal decentralization and economic growth in Nigeria over the period 1980 to 2012 within a multivariate VAR framework and error correction model. The study employed three different measures of fiscal decentralization including sub-national own source revenue as a ratio of total central revenue, sub-national expenditure as a ratio of total federal expenditures, and sub-national own source revenue as a ratio of total federal expenditure. First, results from the cointegration test show significant evidence of a long-run relationship between fiscal decentralization and economic growth in Nigeria. Second, results from the long-run normalized cointegration estimates reveal that the three measures of fiscal decentralization have a positive and significant relationship with economic growth. This finding agrees with the findings of Shahdani et al (2012) and Iimi (2005). However, it contradicts the findings of Aigbokhan (1999) and Philip and Isah (2012).

The granger causality results support the cointegration results indicating that there exists a unidirectional causality running from fiscal decentralization to economic

growth in Nigeria during the study period. The implication of this is that greater levels of decentralization will promote higher levels of economic growth.

The findings of this study show that fiscal decentralization is unarguably a potent economic strategy that can be used to maximize provision of public services as well as promote economic growth. Since the present level of decentralization has impacted positively on economic growth the study recommends the need for government to address the constitutional issue of fiscal powers among the three tiers of government to strengthen the fiscal base of sub national governments.

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