Financial, Public and Regional Economics

Fiscal Decentralisation and Economic Development in Nigeria: Empirical Evidence from VECM Model

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Abstract: This study examines long run and causal relationship between fiscal decentralization and economic development in Nigeria using annual data from 1970-2011. Both sub-national expenditures ratio and sub national revenue ratio were used to measure fiscal decentralisation in Nigeria. The result of the analysis showed that the federally allocated expenditures to sub-national has been greater than its corresponding allocated revenue in Nigeria and this has became pronounced from the year 1999 up till date under the administration of a dominant political party known as People Democratic Party (PDP) in Nigeria. Using VECM, the study found that fiscal decentralisation is cointegrated with economic development in Nigeria. That is, there is a long run relationship between fiscal decentralisation and economic development. The results from the VEC granger causality test showed a unidirectional causality run from economic development to fiscal decentralization i.e. economic development granger causes fiscal decentralization (only sub-national revenue decentralization ratio) in Nigeria. By implication, economic benefits derived from fiscal decentralization are the products of economic development simply because as economy is developing, these benefits emerge in Nigeria.

Keywords: fiscal decentralization; economic development; cointegration; VECM

JEL Classification: G21; G32; H11; H70

Introduction

Fiscal decentralisation which is the devolution of expenditures functions and tax revenue sources from the national government to sub-national government has been on the policy agendas of most developing and transitional economies as well as OECD countries in the recent decade. Both theoretical and empirical estimation have yielded inconclusive results on fiscal decentralisation-growth nexus. Notwithstanding, one of the issues which has not been fully explored is the question of whether rapid development of the economy is fiscal decentralized-led or growth driven. This question is germane because the determination of the direction of causality between fiscal decentralization and performance of the

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economy will enable the policy-makers to formulate appropriate development polces. Some literatures have reported that economic growth as a function of fiscal decentralisation through Ordinary Least Squares (OLS) technique of analysis because efficient resource allocation which lead to sustained increased in per capital income as the sole objectives of fiscal decentralisation. Other studies however, still showed that fiscal decentralisation depends on the level of economic (Letelier, 2003; Oates 1985 among others) because higher income per capital gained from the quality of public goods and services as the basis for additional expenditures used for the constitution of a new decentralised system and as a result there arise the possibility of reversal causality and endogeneity problem between fiscal decentralisation and economic growth (Thiessen 2003; Xie, et al. 1999; Zhang and Zou 1998) which has not been catered for except the study of limi (2005) and this will undoubtedly produce spurious regression analysis.

Moreover, attention of previous empirical studies has not been adequately shifted on the nature and direction of the causal relationship between decentralization and economic growth (Breuss and Eller, 2004) and even few existing studies have reported contradicting results. Roy and Johannes (1992), for example, argue that as economic growth causes fiscal decentralisation because as economies grow and mature, economic benefits from fiscal decentralization will manifest. Therefore, economic growth comes first before fiscal decentralisation. According to Oates (1999) however *But not all would agree (to that conclusion). More generally, it seems to me, we must regard intergovernmental structure as part of a larger political and economic system that both influences and is determined by the interplay of a variety of political and economic forces. It may well be that fiscal decentralization itself has a real contribution to make to improved economic and political performance at different stages of development.*

No consensus has been developed in the literature over the direction (Bodman et al., 2009), as the older studies arguing for a link from economic performance to decentralisation and the newer ones arguing the reverse by using largely the same indicators and datasets (Blochliger et al. 2013). This unresolved issue has led to the problem of endogeneity and spurious regression when fiscal decentralisation is put as regressor in the estimable equation. Therefore, whether fiscal decentralisation granger causes economic growth or otherwise remains an empirical question. According to Sim (1980), if there is simultaneity among a number of variables employed then these variables in the same way, there should be no distinction between exogenous and endogenous variable i.e. all variables are treated as endogenous variables which led to development of VAR model.

This study is focused on Nigeria simply because the country is one of the most decentralised nations in Africa. It is of greater priority to carry out this study in Nigeria because of current clamour for true federalism. More importantly, most studies on fiscal decentralisation-growth nexus have narrowly focused on either

explaining the pattern of intergovernmental relation (Mbanefoh, 1993) within limited context of political economy or using historical and idealistic perspective by employing merely narrative and descriptive tools to analysis unequal allocation of revenue and functions among tiers of government (see for example Akindele and Olaopa, 2002; Suberu, 1991). This methodology is grossly inadequate (World Bank, 1995).

2. Empirical Methodology and Data

2.1 Fiscal Decentralization Measure

The study employed two measures of fiscal decentralization indicators. The expenditure and revenue decentralization measured as the share of sub-central expenditure (x_t) and revenue (z_t) in the general government expenditure and revenue respectively in Nigeria as widely used in the literatures.

The history of Nigerian fiscal decentralization captured with the plot below depict that sub-national expenditure decentralization (SNED) is far more decentralized that sub-national revenue decentralization (SNRD). The plot clearly show sub-national expenditure is higher than sub-national revenue in Nigeria. The federally allocated expenditures to sub-national is far more than its corresponding allocated revenue in Nigeria and this becomes manifest from the year 1999 when the up till date under the administration of a dominant political party known as People
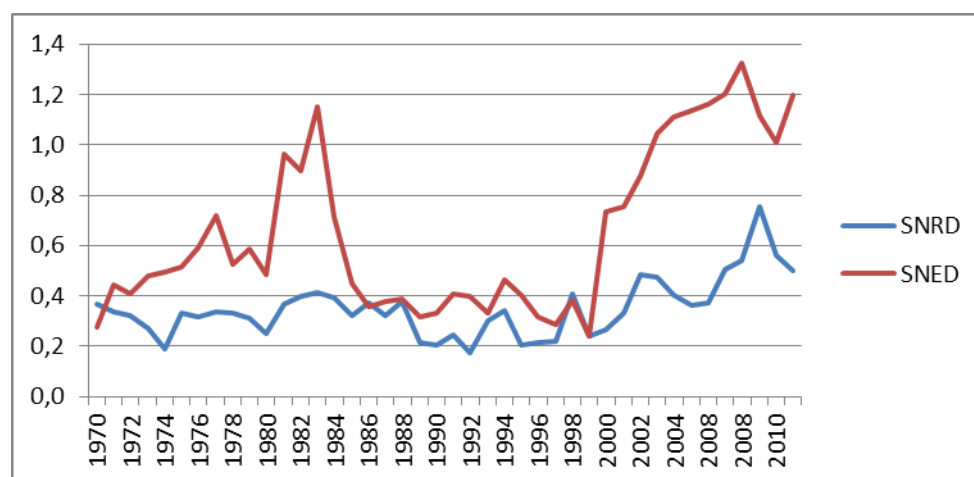
Democratic Party (PDP).

Figure 1. Fiscal Decentralization Measures

2.2   Model Specification

Unlike the simultaneous, or structural, equation models where variables are treated as endogenous and exogenous or predetermined (exogenous plus lagged endogenous), in vector autoregressive (VAR) models however, all the variables are treated as endogenous and as a result, there is no priori distinction between endogenous and exogenous variables. The VAR model is also used for structural inference and policy analysis. In structural analysis, certain assumptions about the causal structure of the data under investigation are imposed, and the resulting causal impacts of unexpected shocks or innovations to specified variables on the endogenous variables in the model can be analyzed. However, when variables involved are non-stationary at level then the application of VAR model is nullified and hence vector error correction model (VECM) which make it inevitable to test cointegration among the variables despite non-stationarity. For the purpose of this analysis, VECM(p) is formulated as follows:

$$\Delta Y_t = a + \sum_{i=1}^{n} \alpha_i \Delta Y_{t-i} + \sum_{j=1}^{n} \beta_j \Delta X_{t-j} + \sum_{k=1}^{n} \eta_k \Delta Z_{t-k} + ecm_{1t-1} + \varepsilon_{It} \ldots\ldots(1)$$

$$\Delta X_t = b + \sum_{i=1}^{n} \delta_i \Delta X_{t-i} + \sum_{j=1}^{n} \gamma_j \Delta Y_{t-j} + \sum_{k=1}^{n} \eta_k \Delta Z_{t-k} + ecm_{2t-1} + \varepsilon_{2t} \ldots\ldots(2)$$

$$\Delta Z_t = c + \sum_{i=1}^{n} \eta_k \Delta Z_{t-i} + \sum_{j=1}^{n} \beta_j \Delta X_{t-j} + \sum_{k=1}^{n} \alpha_i \Delta Y_{t-k} + ecm_{3t-1} + \varepsilon_{3t}. \qquad (3)$$

Where i, j, k, = 1,2...........n

Economic development Y_t is measured by the growth rate of real per capital and ε_{it} are uncorrelated white-noise error term. The data set covers 41 years period of 1970 to 2011 and were obtained and calculated from statistical bulletin published by central bank of Nigeria. As noted elsewhere, there is unidirectional causality that run from X_t to Y_t if the estimated coefficients on the lagged X_t in equation are statistically different from zero as a group i.e. $\sum_{j=1}^{n} \beta_j \neq 0$ in equation 1 and the estimated coefficients on the lagged Y_t in equation 2 are not statistically different from zero i.e $\sum_{j=1}^{n} \gamma_j = 0$. If otherwise, then the causality runs from Y_t to X_t and the relationship is bi-directional when $\sum_{j=1}^{n} \beta_j \neq 0$ and $\sum_{j=1}^{n} \gamma_j \neq 0$. Zero relationship exist if $\sum_{j=1}^{n} \beta_j = 0$ and $\sum_{j=1}^{n} \gamma_j = 0$.

2.3 Multivariate Cointegration Analysis and Error Correction Modeling

Since the cointegration analysis is fairly common and is well documented elsewhere (Banerjee, et. al 1993; Hylleberg and Mizon 1989; Engle and Granger 1987; Johansen 1988; Johansen and Juselius 1990), we have only provided for summary here. According to Johansen (1988), multivariate cointegration model is based on the error correction representation given by:

$$\Delta Y_t = \mu + \sum_{i=1}^{\rho-1} \alpha_i \Delta Y_{t\text{-}i} + \beta Y_{t-1} + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{ (4)}$$

Where Y_t is an (nx1) column vector of ρ variables, μ is an (nx1) vector of constant terms, **α** and **β** captured coefficient matrices, Δ is a difference operator, and $\varepsilon_t \sim$ IID(0, σ^2). The coefficient matrix **β** is known as the impact matrix, and it contains information about the long-run relationships. Johansen's methodology requires the estimation of the VAR equations 1-3 above 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 Y_t. The cointegrating rank can be tested with two statistics: the trace test and the maximal eigenvalue test.

3. The Empirical Results

The study employed Dickey Fuller – Generalized Least Square (DF-GLS) test and Phillip – Perron (PP) test to determine the order of integration and the results showed that all variables employed I(1) series. The study proceeded by testing for long run relationship among the variables of interest using Johansen Cointeration Test which is presented below:

Table 1. Johansen Cointegration Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Max-Eigen Statistic	0.05 Critical Value
None*	0.533201	42.78487	29.79707	28.18867	21.13162
At most 1	0.247555	14.59620	15.49471	10.52383	14.26460
At most 2*	0.104223	4.072376	3.841466	4.072376	3.841466

Source: Computed by the Authors 2013

From the table one above it is observed that both the trace test statistic and the Max-Eigenvalue test indicate one cointegrating equation at 5% level of significant. Therefore, the null hypothesis (H_o) which specifies that no cointegrating vectors is not accepted. Thus, there is long run relationship among the variable of interest. These variables are employed in the VAR model and the result is as follow:

Table 2. VEC Granger Causality Test

Dependent variable: D(GDP)

Excluded	Chi-sq	Df	Prob.
D(LFDEXP)	1.059630	2	0.5887
D(LFDREV)	1.421665	2	0.4912
All	2.852206	4	0.5829

Dependent variable: D(LFDEXP)

Excluded	Chi-sq	Df	Prob.
D(GDP)	0.202554	2	0.9037
D(LFDREV)	0.258137	2	0.8789
All	0.710824	4	0.9500

Dependent variable: D(LFDREV)

Excluded	Chi-sq	Df	Prob.
D(GDP)	8.817940	2	0.0122**
D(LFDEXP)	5.846024	2	0.0538
All	10.90228	4	0.0277**

Source: Computed by Authors 2013

**Significant at 5% level of significant

The table above displays the result of VEC causality test and from this table the causality runs from economic development to fiscal decentralization and not vice versa i.e. economic development granger causes fiscal decentralization in Nigeria at 5% level of significant. Sub-nationals revenue decentralization which is to some according to some authors[1] a better indicator fiscal decentralization because it reflects sub-national government autonomy causes economic development and expenditure decentralization does not in Nigeria.

Table 4. Vector Diagnostic Test

Various test	Statistic	p-value	Remark
Portmanteau test (5)	Q-stat= 14.54106	0.9335	Do not reject H_0
	Adj Q-stat=15.84006	0.8938	
Normality test	Jarque-bera stat = 98.82813	0.0000	Reject H_0
Heteroskedasticity test	Chi-Sq = 152.0222	0.4460	Do not reject H_0

Source: computed by Authors, 2013

In to corroborate the estimation process, the following validation diagnostic test was carried out purposely to cross check the stability of the model. The Portmanteau test was conducted to capture the existence of autocorrelation in the model and the result revealed that we should not reject null hypothesis which is an indication that there is no serial correlation in the error terms. Normality test is equally considered purposely to show may be model is normally distributed. The result also showed that null hypothesis was not accepted which is clear indication that normality assumption is not violated in the specified models by revealing that residuals are multivariate normal. Heteroskedasticity test was equally carried out ant the result showed that the models have constant variance by not rejecting null hypothesis of absence of heteroskedasticity.

4. Conclusion

This paper, empirically investigated long run and causal relationship between fiscal decentralization and economic development in Nigeria. Both descriptive and inferential statistics were employed in analyzing the relationship. The result from descriptive analysis showed that federal government has been assigned more expenditures than the allocation of revenue to sub-national government in Nigeria and this became pronounced under People Democratic Party (PDP) regime since 1999 the party undertook power till date. The results of Johansen cointegration approach revealed that there is a long-run relationship between fiscal decentralization and economic development in Nigeria. Further results from a causality test showed that economic development causes fiscal decentralisation in Nigeria and not vice versa. The implication of this for policy makers is that the higher income per capita is the basis for the additional expenses for the provision of the new constitution in favor of the high degree of fiscal decentralisation, as a result economic development is expected to have positive effect on fiscal decentralization. The study therefore, recommends that emphasis should be placed on the indicators of economic welfare and development.

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