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Government Capital Expenditure and Economic Growth in Nigeria: Any Lesson from Disaggregated Functional Analysis?

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Abstract
This study investigates the influence of disaggregated functional government capital expenditure on economic growth in Nigeria between the periods of 1970 to 2013, using error correction technique of estimation on the data of the economy. The results indicated that the long run relationship exists between the components of public capital expenditure and economic growth. However, the results revealed that disaggregated functional capital expenditure of government did not generate the intending growth to real economic activities. More specifically, capital expenditure on economic service was actually negatively affecting the growth of the economy, though insignificant, implying that the economy did not benefit from such spending. This development in Nigerian economy contravenes the growth theories. We therefore recommend that Nigerian government should adequately monitor all her spending in the economy to achieve the purposes for which the funds are released. Again, all the government projects and allocations should be well supervised to reduce the costs inflated by government officials and contractors.
Keywords: Government, Expenditure, Error Correction, Economic Growth, Estimation

1 Introduction

The argument on whether government capital expenditure has positive or negative impact on economic growth has, for years, continued to provoke series of economic controversies and debates among economic scholars in the public finance literature. The nature of government spending impact on growth is left inconclusive as well. Some authors such as Laudau (1985), Folster and Henrekson (2001, Ekpo (2005), submitted that government capital expenditure has negative and insignificant influence on economic growth, while other authors like Donald and Shuaglin, (1993), Niloy, et al (2003),Komain and Brahmasrene, (2007), Ranjan and Sharma (2008), Muritala and Taiwo (2011) and so on, found that government capital spending significantly and positively influence economic growth. Another view maintained neutral ground on this issue and conclude that government capital expenditure does not exert any impact on economic growth (Gupta et al, 2002).

In theory, generally, the relationship between government expenditure and economic growth is ambiguous as well. Given the Hobbesian view, certain functions of government such as the protection of individual and their property and the operation of court system to resolve disputes enhance economic growth. He also submitted that securing property rights, enforcement of contracts and a stable monetary regime provide the foundation for the smooth operation of a market economy. Therefore, government can enhance growth through efficient provision of infrastructure. In addition, there are goods which economists regard as “public goods” which markets may find difficult, if not impossible, to provide because their nature makes it cumbersome or costly to affect their transactions. Roads and national defense fall into this category.

Table 1 shows that capital expenditure on economic service had a fair share (43%) of total capital expenditure between1970 to 1979, a development which might not be unconnected with the post-civil war reconstruction efforts embarked upon by the government at federal level. A substantial proportion of total government capital expenditure was equally voted for economic service between 2000 and 2004. Between 1990 and 1999, capital expenditure on transfer payment received an unparalleled attention of the military government which preceded the dawn of democratic rule in Nigeria.

The issue of how government capital spending affect economic growth has been tackled differently by economic scholars. While a good number adopted aggregated approach, a few authors employed a disaggregated analysis with mixed results. Upon this background, this study is set to examine the effects of disaggregated functional government capital expenditure on economic growth in Nigeria. Specifically, studies concentrate on effects of total government expenditure on economic growth, while others focused on the causality between capital expenditure and economic growth. Yet others examined the effect of sectoral capital expenditure on growth. A few studies have considered disaggregated functional capital expenditure without paying attention to effect each of these components places on economic growth.

The primary objective of this paper therefore, is to examine the growth effects of `different categories of functional public capital expenditure in Nigeria, paying particular attention to their individual contribution to economic growth while also recognizing the possible existence of correlation among the expenditures that may result in spurious coefficients in the growth equation due to omitted variables. Here, we are not interested in the

financing of any particular public expenditure *per se*, but we include the important financing variables which are recurrent expenditure and public revenue.

This study is divided into six sections. The first section provides the introduction of the study; second section presents the overview of the literature, the third section holds model specification, the section that follows contains the methodology and data source, section five presents the results and discussions of the paper and finally, section six provides summary and conclusion.

2 Review of Literature

Starting from Keynes (1936), empirical economic literature have raised issues with respect to desirability or otherwise of extant fiscal macroeconomic policy in addressing economic crises; unemployment issue, fluctuations in growth rate of GDP over time, balance of payment disequilibrium, economic instability and a number of others. Again, specifically, quite a number of theorists in macroeconomics have provided series of explanations in relation to public expenditure and economic growth. Their arguments try to establish whether government expenditure exert a positive, negative or neutral effect on economic growth.

Although the classical economists disregard the influence of government as critical tool in promoting economic growth as well as stabilizing it. This school of thought posits the self-regulating mechanisms of the economy through the interplay of the market forces (the invisible hands of demand and supply) which would restore the economy back to equilibrium distortion. However, John Maynard Keynes, in his wide celebrated work titled "The General Theory of Employment, Interest, and Money" published in 1936, posits that, given the market mechanism inefficiency, the government intervention can fill the gap between the aggregate demand and aggregate supply (Al-hoqubani2002). In other words, Keynes and his supporters raised a notion that even in times of recession, fiscal policies could boost economic activities – that is, expansionary fiscal policies could increase an economy's output. The intervention of government in an economy relative to the market system is, therefore, considered as an important source of economic growth.

Having considered the theoretical hub of government expenditure in relation to economic growth, the empirical studies including Josaphat et al. (2000) investigated the impact of disaggregated government spending on economic growth in Tanzania, using time series data. The authors adapted Ram (1986) model in which total government expenditure is disaggregated into expenditure on (physical) investment, consumption spending and human capital investment. The study found that increased productive expenditure (physical investment) has a negative impact on growth but consumption expenditure relates positively with growth.

Niloy et al. (2003) examined the growth effects of disaggregated government expenditure (sectoral) for a panel of thirty developing countries (including Nigeria). The authors' results showed that the share of government capital expenditure as a ratio of GDP is positively and significantly correlated with economic growth, but reverse holds for recurrent expenditure. Further, the result at sectoral level revealed that government investment and total expenditures on education are the only outlays that remain significantly associated with growth throughout the analysis.

Dauda (2010) examined the effect of government spending on education on economic growth of Nigeria, using thirty-one (31) years' time series data from 1977 to 2007. The study employed cointegration and error correction techniques. The result shows positive and significant effect of educational expenditure on economic growth.

Godwin and William (2010) examined the relationship between government expenditure, money supply, prices and output in Nigeria, using two-stage least squares method. They found that the expenditure decision of the government is significantly determined by government revenue and one–year lag of government expenditure. However, government expenditure was found wanting in catalyzing the growth of the economy. Their results also revealed that money supply was a positive and significant function of prices and also granger caused prices with no reverse or feedback effect. Again, the stock of money exerted a positive and significant influence on the growth of the economy while prices were found to have a significant reducing effect on the real GDP. Other studies include Ekpo (2005), Ighodaro and Oriakhi (2010), Nurudeen and Usman (2010), Mba and Olugu (2011), Udah (2012), Olukayode (2009), Oyinlola (1993), Ogiogio (1995) and Shonekan (1997), among others. The criticism of all these studies evidently rely on the fact that their analyses have not covered the most critical period in Nigerian economy, 1970s, the period that witnessed the reconstruction efforts of the government after the civil war and again, to the best of our knowledge, no study has investigated the impact of functional disaggregated government capital expenditure in Nigeria within the period covered by the study.

3 Model Specification

The study adopted the neoclassical Solow growth model with modifications. According to Solow's formulation, the sum of economic activities in an economy is a function of capital accumulation, technological progress and labour. That is:

$Y_t = (K_t, A_t L_t)$ .....(1)

Where Y_t is aggregate level of output, K_t measures capital accumulation, A_t presents technological progress, t is time period and L_t measures the size of the Labour force in an economy. The theory supports the argument that, in a developing open economy like Nigeria, improvement in technology supply exerts a tremendous economic growth which can be financed by the government. This can be made possible either by fiscal policy through capital expenditure of the public, reduction of income tax or monetary policy through the reduction of interest rates which encourages investment efforts. Now, we decompose technological progress (A_t) in equation (1) to encompass disaggregated functional capital expenditure of the government in Nigeria to include; General Administration Capital Expenditure (ADM), Economic Service (ESER), Social and Community Services (SSER) and Transfer Payment (TRP). log(K_t) and $Log(L_t)$ are index of capital and labour changes that varies overtime and are held constant in this study. Therefore, we have a measure of economic activities that relates to disaggregated functional capital expenditure of the government as given in the equation below:

Log(Y_t) =Log(ADM,ESER,SSERTRP) ……..(2)

Where Y_t is the log of total output of the economy represented by Log(GDP).

Transforming equation (2) into econometric model, we have;

$lnGDP_t = \beta_0 + \beta_1 \ln ADM_t + \beta_2 \ln ESER_t + \beta_3 \ln SSER_t + \beta_4 \ln TRP_t + \mu_t$ …… (3)

Equation (3) is non-spurious only if the variables in the model are stationary. Taking the first difference of all the variables, thus, we have equations below:

$ln\Delta NGDP_t = \beta_0 + \beta_1 ln\Delta ADM_t + \beta_2 ln\Delta ESER_t + \beta_3 ln\Delta SSER_t + \beta_4 ln\Delta TRP_t + \beta_5 ln\Delta TREV_t + \beta_6 ln\Delta REXP_t + \beta_7 ln\Delta INF_t + \beta_8 ECM_{t-1} + \mu_t$ …… (4)

$ln\Delta NGDP_t = \beta_0 + \beta_1 ln\Delta CPEX_t + \beta_4 ln\Delta TRP_t + \beta_5 ln\Delta TREV_t + \beta_6 ln\Delta REXP_t + \beta_7 ln\Delta INF_t + \beta_8 ECM_{t-1} + \mu_t$ …… (5)

$ln\Delta RGDP_t = \beta_0 + \beta_1 ln\Delta ADM_t + \beta_2 ln\Delta ESER_t + \beta_3 ln\Delta SSER_t + \beta_4 ln\Delta TRP_t + \beta_5 ln\Delta TREV_t + \beta_8 ECM_{t-1} + \mu_t$ …… (6)

$ln\Delta RGDP_t = \beta_0 + \beta_1 ln\Delta CPEX_t + \beta_5 ln\Delta TREV_t + \beta_6 ln\Delta REXP_t + \beta_7 ln\Delta INF_t + \beta_8 ECM_{t-1} + \mu_t$ …… (7)

In models (4-7), we introduced log functions to the models to be able to capture the percentage changes that shocks to disaggregated functional public expenditure have brought on economic growth of Nigeria. We equally used log difference of$\ln\Delta TREV_t$, $\ln\Delta REEXP$ and $\ln\Delta INF_t$ as intervening variables of the models. TREV represents total revenue expenditure of the government, REXP stands for recurrent government expenditure and INF presents inflation rates in the economy. All these variables are fundamentals to the growth of an economy. β_0 is the intercept, depicting level of economic growth at zero level of government influence. $\beta_{1...}\beta_8$ are parameters of estimation and μ_t is the stochastic error term which is a vector of unobservable components of the model. Models 4, therefore, captures the effects of disaggregated functional government capital expenditure on nominal economic growth in Nigeria and model 5 explains the effects of total government expenditure on nominal GDP, while model 6 captured the influence of disaggregated functional government expenditure on real GDP and model 7 explained the effects of total capital government expenditure on real GDP. The coefficients of ECM represent the speed of adjustments with which the dependent variables are adjusting to equilibrium after innovation.

4 Technique of Estimation and Data Source

Whether disaggregated functional government capital expenditure exerted influence on the growth of economic activities in Nigeria between the period of 1981 and 2012 was investigated. The process necessitated the employment of econometric techniques. The techniques include sationarity tests of the series; to determine the order of integration, cointegration test; to examine the long-run relationship and Error Correction Model (ECM); to determine the short-run effects and adjustment to long-run of disaggregated functional government capital expenditure on economic growth of Nigeria. The error correction model applies to any model that estimates the rate at which changes inY_t return to equilibrium after shocks. ECM has a good behavioural justification in that it implies that the behaviour of Y_t is tied to $X_t$in the longrun and that short run changes in Y_t respond to deviations from that long run equilibrium (Domowitz and Hakkio1999).

More specifically, we observe that any change in Y_t is a sum of two effects: First, the short-run impact of the change in $X_t$on Y_t and second, the long-run impact of the deviation from the equilibrium value in period t adjusted at each period at the rate equivalent to the coefficient of the ECM lagged by one period, which gives the rate the model re-equilibrates i.e. the speed at which variable returns to its equilibrium level. Formally, it tells us the proportion of the disequilibrium which is corrected with each passing period. This coefficient should be negative and less than the absolute value of unity, indicating its re-equilibrating properties. Thus β_i captures the short-run relationship between X and Y. It indicates how Y and ΔY immediately change if X goes up one period.

5 Results and Discussions

First, we determined the time series properties of the data since the issue of stationarity of time series affects the consistency of the estimates of ECM. Thus, it becomes essential to examine the order of integration of data employed in the study. We used Augmented Dickey Fuller and Philip-Perron unit root tests with trend and intercept to determine the presence of unit root and the order of integration of the variables.

The results presented in Table 2 clearly indicate that all series except INF exhibit unit root property at levels. Using both ADF and PP statistical tests, all the variables are I(1) series and therefore achieve stationary at first difference, using 5 per cent level of significance. The results imply that all series have to be differenced once in our models in order to avoid spurious results. However, first difference only accounts for short run relationships among series and this problem is addressed by finding cointegration among the series. The results of the cointegration tests are reported in appendix as well.

Table 3 presented the results of Johansen cointegration- the long run relationship among nominal income series (NGDP), disaggregated functional capital expenditure, total revenue, recurrent expenditure and inflation as reported in models 1 and 2, while that of real income series (RGDP) are reported in model 3 and 4 respectively. Indeed, in all the models except for model 4, capital expenditure on economic service (ESER), Social and community service (SSER), transfer (TRSF), public revenue (REV), recurrent expenditure (REXP) and inflation (INF) series cointegrated with nominal income series and real income series. The evidence of cointegration was further confirmed by the stationarity of the residual terms (ECM) reported in the last row of each model except for model 4. Both the ADF and PP tests confirmed that residual terms are, indeed, stationary in models 1, 2 and 3. The evidence of cointegration conforms to error correction mechanism models where both the short and long run relationships are examined.

The results of estimated ECM parsimonious models are reported in table 4 in the appendix. Models 1 and 2 reported nominal income (NGDP) models with disaggregated functional capital expenditure and aggregate capital expenditure respectively while models 3 and 4 reported real income (RGDP) with disaggregated functional capital expenditure and aggregate capital expenditure respectively. The results clearly revealed that the coefficients of error correction terms [ECM(-1)], which lie between 0.15 and 0.76 for all models, are significantly negative at 1 per cent level of significance for model 1, 2 and 3. The results conformed to *a priori* expectation in terms of sign.

The effects of disaggregated functional capital expenditure and total capital expenditure on nominal GDP is presented in models 1 and 2 respectively, while the effect of disaggregated capital expenditure and aggregated capital expenditure on real income is presented in models 3 and 4. The implications of these results, however, are that public capital expenditure on administration, social community service, economic service and transfer, including public revenue, recurrent expenditure and inflation rate series exhibited long run relationship with both nominal and real income growth series. Nominal income models exhibited high F-statistic that are significant at 5 per cent level of significance and high coefficients of determination (R^2) with evidence of no first order autocorrelation as indicated by DW statistics. Similar results are also reported for real income model of disaggregated functional capital expenditure but with lower (R^2) than that of nominal income model and F-statistics that is only significant at 10 per cent level of significance. However, model 4 which captured the relationship between aggregate capital expenditure and real income series exhibited no relationship both in the short run and long run as indicated by insignificant F-statistic and very low coefficients of determination (R^2).

Table 5 showed the results of parsimonious ECM. The results reported for nominal GDP models clearly did not support significant role for lagged nominal income value. This may indicate that past values of nominal income did not influence its current value for both nominal and real income series. The effect of administrative capital expenditure at level and the first lag [LADMIN(-1)] was positive and significant in model 1 at 1 per cent and 10 per cent level of significance respectively, while it was negative at level and insignificant in model 3. The result has support for the theory in terms of sign, which has significant role in the nominal growth process. Capital expenditure on economic services however, was negative and insignificant at level in model 1, while it was also negative but significant in models 2 and 3. This showed that capital expenditure on economic service has negative effect on real income at 5 per cent level of significance.

In another development, the result showed that capital expenditure on social community service borne a significant positive effect on both nominal and real income at 10 per cent level of significance, both at level and at lag 1. The insignificant positive effect of the second lagged value of social community service [LSSER(-2)] was also reported in model 1 while its significant negative effect was reported for real income growth process presented in model 3. The effect of capital expenditure on transfer was insignificant for both nominal and real income growth process.

The effects of recurrent expenditure (REXP), public revenue (REV) and inflation rate (INF) which were auxiliary variables in the models though mixed reveal that recurrent expenditure has positive effect on nominal and real income at level. While it has a significant effect at 5 per cent level of significance for real income in model 3, the effect is insignificant for nominal income. However, the first and the second lagged values of

recurrent expenditure {[REXP(-1) and [LREXP(-2)]} indicate a negative and significant effect on nominal income at 1 per cent level of significance while that of real income is insignificant. Also, there is strong indication that revenue policy of the government has significant positive role to play in income generation in Nigeria as revealed by its positive and significant effect on nominal income at 1 per cent level of significance. The first lagged value however present a negative and significant effect on nominal income. The significant positive lagged value of inflation rate is also recorded in model 1.

6 Summary and Conclusion

This paper analysed the effects of disaggregated functional government capital expenditure on economic growth in Nigeria, using Error Correction Mechanism. The study used annual time series from 1970 to 2013. The cointegration test indicated the existence of long run relationship among nominal income series (NGDP), disaggregated functional capital expenditure, total revenue, recurrent expenditure and inflation. This evidence of cointegration conformed to error correction models where both the short and long run relationships were examined.

It is obvious from the result that capital expenditure on economic service produced negative, though insignificant effects on real economic growth of Nigeria, which might not be unconnected with the persistence of misappropriation of priority in term of capital project financing in the country. The study therefore concluded, among others, that, given the hindsight provided, disaggregated functional government capital expenditure did not have significant impacts on economic growth of Nigeria; hence, the economy was service driven and responsive to private capital investment respectively. Government funds allocated to capital expenditure were not properly utilised to have generated the intended effects in the growth of the economy. The study provides contributions to the empirical and academic literature as well as furnishing policy makers with the necessary information by determining the effects of components of capital expenditure of government in Nigerian economy.

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Appendix

Table 1: Categories of Capital Expenditure as a Percentage of Total Capital Expenditure and Real GDP Growth Rate in Nigeria from 1970-2013

Year	Admin	Eco Serv	Soc Serv	Transfer	RGDP GR
1970-1979	24.64	43.67	15.29	16.40	2.69
1980-1989	14.08	33.14	15.73	37.05	2.19
1990-1999	12.04	38.72	5.82	43.42	2.87
2000-2004	26.40	52.21	13.11	8.48	11.19
2005-2009	30.80	48.36	14.29	6.01	6.39
2010-2013	29.71	43.58	11.74	17.42	6.04

Source: CBN

Table 2: ADF and PP Unit Root Test

	ADF Test		Pillips-Perron Test		Order of Integration
Series	At Level	First Diff	At Level	First Diff	I (1)
LRGDP	-2.4288	-6.0396*	-5.4732*	-6.0488*	I (1)
LNGDP	-0.6479	-5.6025*	-0.6335	-5.5981*	I (1)
LESER	-2.3252	-6.2778*	-2.1876	-6.2915*	I (1)
LSSER	-2.3376	-8.3739*	-3.1253*	-8.3270*	I (1)
LTRSF	-2.6478	-7.5086*	-2.5192	-15.0192*	I (1)
LREV	-1.2601	-6.4229*	-1.3071	-6.4545*	I (1)
LCEXP	-1.7740	-6.7793*	-1.7681	-6.8138*	I (1)
LREXP	-0.4541	-7.9750*	-0.4039	-8.3286*	I (1)
INF	-3.8738*	-5.3321*	-3.8346*	-15.7562*	I (0)
5% Critical Values	**-2.9314**	**-2.9332**	**-2.9314**	**-2.9331**	

Source: Authors' Computation. * represents stationary at 5 percent significance level

Table 3: Johansen Cointegration Results

Series	Model 1 LNGDP	Model 2 LNGDP	Model 3 LRGDP	Model 4 LRGDP
C	2.0669*** (9.0862)	1.8390*** (12.4444)	5.8769*** (9.7270)	6.2823*** (13.4013)
LCPEX		0.1488** (2.0605)		0.5201** (2.2698)
LADMN	0.1021 (1.0584)		-0.7838*** (3.0580)	
LESER	0.0768 (1.1976)		-0.0281 (0.1649)	
LSSER	-0.0445 (0.8038)		0.4619*** (3.1426)	
LTRSF	0.0184 (1.1925)		0.07034* (1.7196)	
LREXP	0.6267*** (6.1482)	0.6593*** (7.2771)	0.5095* (1.9921)	0.1324 (0.4607)
LREV	0.2495** (2.4369)	0.2263** (2.1993)	0.2686 (0.9878)	-0.1215 (0.3721)
INF	-0.0022 (1.1113)	-0.0027 (1.4349)	0.0078 (1.4935)	0.0114* (1.9021)
R2	0.9949	0.9945	0.8727	0.8067
F-Statistics	994.70	1771.79	35.2423	40.69
DW	1.4402	1.225	1.015	0.4062
ECM: ADF PP	-4.8120 -4.6018	-4.3210 -4.1195	-3.7596 -3.7239	-2.3311 -2.2674

Source: Authors' Computation. *, ** and *** indicate 10, 5, and 1 per cent level of significance.

Table 4: ECM Parsimonious Economic Growth Modelling Results

Variable	Model 1 Δ LNGDP	Model 2 Δ LNGDP	Model 3 Δ LRGDP	Model 4 Δ LRGDP
Constant	0.0204 (0.2903)	0.1042** (2.3546)	0.2650 (1.5747)	0.1560 (1.1455)
Δ LNGDP (-1)	0.1641 (0.9294)	0.1690 (0.9901)	0.1124 (0.7046)	
Δ LNGDP (-2)				
Δ LCPEX		0.0756 (0.9718)		-0.0741 (0.3633)
Δ LCPEX (-1)		0.0794 (1.3621)		0.2029 (0.8882)
Δ LCPEX (-2)		0.0710 (1.2385)		-0.0395 (0.2073)
Δ LADMIN	0.1541*** (2.6840)		-0.1416 (1.2985)	
Δ LADMIN(-1)	0.1029* (1.6778)			
Δ LADMIN(-2)				
Δ LESER	-0.0675 (1.1888)		-0.2771** (2.3669)	
Δ LESER(-1)	-0.0988 (1.1029)		0.1019 (0.9399)	
Δ LESER(-2)			0.0695 (0.6564)	
Δ LSSER	0.0747* (1.8696)		0.1551* (1.8531)	
Δ LSSER(-1)	0.0988* (1.9776)			

Variable	Model 1 Δ LNGDP	Model 2 Δ LNGDP	Model 3 Δ LRGDP	Model 4 Δ LRGDP
Δ LSSER(-2)	0.0315 (0.9607)		-0.1898** (2.1726)	
Δ LTRSF	0.0113 (1.3776)		-0.0230 (1.2157)	
Δ LTRSF(-1)	0.0073 (0.7616)		0.0323 (1.2877)	
Δ LTRSF(-2)			-0.0260 (1.1309)	
Δ LREXP	0.0916 (1.0494)	0.0737 (0.8686)	0.4372** (2.0716)	0.0014 (0.0053)
Δ LREXP(-1)	-0.3698*** (3.2764)	-0.2850*** (2.5651)	0.1145 (0.5184)	-0.0355 (0.1269)
Δ LREXP(-2)	-0.3267*** (3.0839)	-0.2450** (2.3898)		-0.0583 (0.1963)
Δ LREV	0.1969*** (2.8858)	0.2616*** (4.0207)		0.0497 (0.2424)
Δ LREV(-1)	-0.2581*** (2.9791)	-0.1452* (1.7199)		0.0912 (0.4427)
INF		0.0009 (0.6143)		0.0014 (0.3456)
INF(-1)	0.0046*** (3.2869)	0.0034** (2.3813)		-0.0006 (0.1252)
INF(-2)	0.0015 (0.9264)			-0.0034 (0.8058)
ECM(-1)	-0.7618*** (4.6502)	-0.5780*** (3.6644)	-0.3634*** (3.2733)	-0.1502 (1.3994)
R^2	0.7921	0.6717	0.4803	0.2496
F-Statistic	4.6568***	4.7736***	1.9198*	0.5543
DW Statistic	2.2827	1.8268	1.9962	2.1101

Source: Authors' Computation. Figures in parentheses represent t-statistics while */**/*** indicate 10, 5 and 1 per cent level of significance respectively. Δ represents first difference.

Table 5: ECM Parsimonious Economic Growth Modelling Results

Variable	Model 1 Δ LNGDP	Model 2 Δ LNGDP	Model 3 Δ LRGDP	Model 4 Δ LRGDP
Constant	0.0204 (0.2903)	0.1042** (2.3546)	0.2650 (1.5747)	0.1560 (1.1455)
Δ LNGDP (-1)	0.1641 (0.9294)	0.1690 (0.9901)	0.1124 (0.7046)	
Δ LNGDP (-2)				
Δ LCPEX		0.0756 (0.9718)		-0.0741 (0.3633)
Δ LCPEX (-1)		0.0794 (1.3621)		0.2029 (0.8882)
Δ LCPEX (-2)		0.0710 (1.2385)		-0.0395 (0.2073)
Δ LADMIN	0.1541*** (2.6840)		-0.1416 (1.2985)	
Δ LADMIN(-1)	0.1029* (1.6778)			
Δ LADMIN(-2)				
Δ LESER	-0.0675 (1.1888)		-0.2771** (2.3669)	
Δ LESER(-1)	-0.0988 (1.1029)		0.1019 (0.9399)	

Variable	Model 1 Δ LNGDP	Model 2 Δ LNGDP	Model 3 Δ LRGDP	Model 4 Δ LRGDP
Δ LESER(-2)			0.0695 (0.6564)	
Δ LSSER	0.0747* (1.8696)		0.1551* (1.8531)	
Δ LSSER(-1)	0.0988* (1.9776)			
Δ LSSER(-2)	0.0315 (0.9607)		-0.1898** (2.1726)	
Δ LTRSF	0.0113 (1.3776)		-0.0230 (1.2157)	
Δ LTRSF(-1)	0.0073 (0.7616)		0.0323 (1.2877)	
Δ LTRSF(-2)			-0.0260 (1.1309)	
Δ LREXP	0.0916 (1.0494)	0.0737 (0.8686)	0.4372** (2.0716)	0.0014 (0.0053)
Δ LREXP(-1)	-0.3698*** (3.2764)	-0.2850*** (2.5651)	0.1145 (0.5184)	-0.0355 (0.1269)
Δ LREXP(-2)	-0.3267*** (3.0839)	-0.2450** (2.3898)		-0.0583 (0.1963)
Δ LREV	0.1969*** (2.8858)	0.2616*** (4.0207)		0.0497 (0.2424)
Δ LREV(-1)	-0.2581*** (2.9791)	-0.1452* (1.7199)		0.0912 (0.4427)
INF		0.0009 (0.6143)		0.0014 (0.3456)
INF(-1)	0.0046*** (3.2869)	0.0034** (2.3813)		-0.0006 (0.1252)
INF(-2)	0.0015 (0.9264)			-0.0034 (0.8058)
ECM(-1)	-0.7618*** (4.6502)	-0.5780*** (3.6644)	-0.3634*** (3.2733)	-0.1502 (1.3994)
R^2	0.7921	0.6717	0.4803	0.2496
F-Statistic	4.6568***	4.7736***	1.9198*	0.5543
DW Statistic	2.2827	1.8268	1.9962	2.1101

Source: Authors' Computation. Figures in parentheses represent t-statistics while */**/*** indicate 10, 5 and 1 per cent level of significance respectively. Δ represents first difference.