International Journal of Economics, Commerce and Management
United Kingdom Vol. II, Issue 12, Dec 2014
http://ijecm.co.uk/ ISSN 2348 0386

INFLATION DYNAMICS AND GOVERNMENT SIZE IN NIGERIA

BigBen Chukwuma Ogbonna
Department of Economics, Ebonyi State University, Abakaliki, Nigeria
bigbenogbonna@yahoo.com

Abstract

The objective of this paper is to gauge the correlation between government size and developments in consumer price index with recourse to Nigeria for the period of 1981-2013. The study was implemented within the frame-work of the so called systems equations, founded on co-integration and vector error correction model (VECM) methods. The results indicate that: (i) Long run equilibrium relationship exist between consumer price index and government size in Nigeria. (ii) No long run causal relationship was identified between consumer price index and government expenditure in Nigeria. (iii) There is no short run causality running from government expenditures to consumer price index in Nigeria. The results further suggest that a development in consumer price index in Nigeria is a function of its previous period values (inflationary expectations) and exchange rate of the domestic currency, meaning that the much touted assumption by policy makers in Nigeria, that government size causes inflation, is not supported by this enquiry. The above results present some policy implications that government of Nigeria cannot comfortably regulate the levels of inflation in the economy by moderating the level of its expenditures. This suggests that government expenditure should not be intended for the moderation of developments in consumer price index, rather, Policy measures designed to ensure effective and appropriate pricing of the domestic currency should be put in place for effective control of inflation in Nigeria.

Keywords: Government size, Inflation, Co-integration, VECM, Causality Test, Nigeria

INTRODUCTION

The use of fiscal policy as a measure for the control of inflation rates has received close consideration in the debates among economists; (see: Ruge-Murcia, 1999, Yunus and Giovanni, 2011, & Dimitrios, 2010) amongst others. They are of the view that certain fiscal indicators contain additional statistically significant information to explain the variation on inflation rates and to this extent demonstrate that the level of inflation is strongly correlated with the level of public expenditure and vice versa. Further analysis of this correlation can also be seen, instead, from the perspective of what is designated as "Patinkin effect". For Don Patinkin, inflation also has a negative impact on the fiscal deficit, through the negative effect it produces in public spending (Patinkin, 1993). For some other authors, the correlation between inflation and government size are more often in the hyperinflation economies, and even for these economies, this association is apparent only during periods of high inflation, else this relationship become inconsequential in the economies of low inflation; (See: Luis & Marco, 2005, 2001, Carlos al., 2002). The emerging economies have had their own share of empirical studies addressing the issue of the effects of fiscal policy on growth and inflation. While some of studies identified a close relationship between these variables either way, i.e positively or negative (see, Sanjeev et al., 2005, Dhaneshwar, 1995, Shantayyanan et al., 1996, Abu-Qarn, 2003,), some other studies failed to identify any significant association between the duos (see: Dakurah et al., 2001, Abizadeh & Yousefi, 1998) amongst others.

Generally, the inflation rate may at any point in time be used as a measure of the price stability in an economy and theoretically, reflects the general rise in prices of goods and services which can be decomposed into demand pull and cost push inflation**.** The objective of exchange rate policy was derived from the overall objective of macroeconomic management, to achieve internal and external balance in the medium term. Internal balance means the level of economic activity consistent with the satisfactory level of inflation (Williamson, 1982),

In the system of floating exchange rates, exchange rate fluctuations can have a strong impact on the level of prices through the aggregate demand (AD) and aggregate supply (AS). On the aggregate supply, depreciation (devaluation) of domestic currency can affect the price level directly through imported goods that domestic consumers pay. However, this condition occurs if the country is an international price taker. Non direct influence from the depreciation (devaluation) of currency against the price level of a country can be seen from the price of capital goods (intermediate goods) imported by the manufacturer as an input. The weakening of exchange rate will cause the price of inputs to be more expensive, thus contributing to a higher cost of production. Manufacturers will certainly reflect the increase in cost in the prices of goods

that will be paid by consumers. As a result, the aggregate price level in the country increases or if it continues it will cause inflation (Achsani, et. al, 2010).

For the few years past in the economic history of Nigeria, the pace of economic growth appear to be epileptic but government expenditure as a proportion of gross domestic product has kept a rising profile and the trend of inflation rate appears to be on the path of increase. Central Bank of Nigeria's Statistical Bulletin 2012 as published in 2013, shows percentage innovations in aggregate government size as 9.52, -9.66, 20.59, 6.90 and -7.38 for 1981, 1991, 2001, 2010 and 2012 respectively with inflation rates responding as follows: 7.7 for 1981, 5.72 for 1991, 18.87 for 2001, 13.72 and 12.22 for 2012. Like many countries, industrialized and developing, one of the most fundamental objectives of macroeconomic policies in Nigeria is to sustain high economic growth together with low inflation. There is the need to highlight here that Price stability does not portend static general price level of goods and services, but rather simply suggests that the rate of such changes is such that it does not attract attention of economic and policy agents. Steady increase in the general price level of goods and services over a long time frame provides evidence of inflation spiral. It is of essence to appreciate that volatility in the general price level erodes the power of money to function as a store of value. To this extent, this will stunt savings, discourages investment, growth, and creates uncertainty and distortions in the economy, to beget unreliable economic planning.

In order to remedy the undesirable economic syndrome, government has introduced a lot of policy measures intended at controlling inflation which has plagued Nigeria since the inception of the present guided deregulation. Of essence among the policy options is the fiscal policy which involves the use of government expenditure and taxation for the control of inflation. Meanwhile, government expenditure is the most frequently used instrument to pursue the stabilization goal of fiscal policy. This may be attributed to the would-be adverse effect (which may be counterproductive) of increase in tax for an economy where over 83% of its citizens are living below the poverty line of $2.00 a day (WDI, 2012). Notwithstanding the intensity and frequency of the use of this choice policy option, the rate of inflation still remains relatively very high in Nigeria, meaning that inflation rate appears not to be substantially responsive to adjustments in the levels of public expenditure. It is on the strength of this suspicion that we consider it plausible to investigate the extent to which causal relationship exists between innovations in government size and developments in inflation rate in Nigeria.

The main objective of this study is to investigate the causal relationship between government size and inflation rate for the case of Nigeria. Nigeria has been battling with the two digit inflation rates for a long period of time now. Specifically, we implement co-integration and vector autoregressive analyses to test for the extent of existence of long-run relationship and

gauge the causal direction between government size and inflation rate respectively, for the period of 31 years (1982-2013).

The scope of the study in terms time frame is constrained by our desire to decompose public spending in Nigeria into four board sectors. This has limited the source of data to Central Bank of Nigeria Statistical Bulletin and the time frame for the study due to the non availability of such sectoral data before 1982.

The remaining part of this paper is structured as follows: Section 2 provides a brief review of related literature, section 3 presents data and methodology, section 4 presents and discuses the empirical results and section 5 the concluding remarks.

REVIEW OF RELATED LITERATURE

In this section, we review some the empirical works investigating inflation – government size relationship. This is intended to provide guide for this study in terms of comparative analysis of the results of studies of similar nature with that of this study and evaluation of the earlier studies in this direction to afford the author the opportunity to identify the existing gap which provides justification for the study.

Ezirim et al (2008), investigates the relationship between public expenditure growth and inflation in the United States of America using the co integration analysis and Granger Causality Model applied to Time Series Annual Data from 1970 – 2002. The results indicate that public expenditure and inflation are co integrated and thus there exist a long-run equilibrium relation between the two variables. Furthermore, the study identified a bi-causational relationship between public expenditure growth and inflation in the United States of America. This result suggests that while for the United States economy, public expenditure growth may be seen to exacerbate inflationary pressures; such inflationary spiral also significantly influences public expenditure decisions. This provides evidence that within the period under review in this study, public expenditure growth was seen to have positive relationship existing between it and inflationary pressures in the country. In effect, the efficacy of Keynesians proposition that sees fiscal policy as a veritable tool to combating inflation in the developed countries is not violated for United States. The study was carried out on a developed economy of the United States. In the current study, we intend to replicate same in a developing economy like Nigeria with some modifications for the purpose of comparison.

COSIMO (2011), Assesses the empirical evidence of the nexus between public expenditure and inflation for the Mediterranean countries during the period 1970-2009, using a time-series approach. A succinct survey of related econometric literature was undertaken by the author before proceeding to the discussion of data and the econometric methodology.

Preliminary investigation of the suitability of the data employed for purposes intended, stationary tests reveal, generally, that public expenditure/GDP ratio is stationary at first difference, i.e a I(1) process, while prices index was found to be stationary only after two periods lag, i.e a I(2) process. Results of the study identified a long-run relationship between the growth of public expenditure and inflation for Portugal only. For the Granger causality tests, results revealed evidence of uni-directional short-run causality flowing from expenditure to inflation for Cyprus, Malta and Spain; and bidirectional causality, for Italy; and uni-directional causality flowing from inflation to public expenditure for France. Certainly, this result is subject to the time period examined, status of data employed and statistical methods used.

For Song & Casey (2008), it is commonly supposed in public and academic discourse that inflation and big government are related. The authors explain that economic theory conveys such a prediction only in special cases. At the instance of their results, they are of the view that inflation is significantly positively related to the size of government mainly when periods of war and peace are compared. Evidence delivered from their results indicated a weak positive peacetime time series correlation between inflation and the size of government and further slips into negative, the correlation between inflation and non-defense spending, putting cross-country analysis into perspective.

Ozurumba (2012) examines the causal relationship between inflation and fiscal deficits in Nigeria, covering the period 1970-2009. This was carried out by way of developing an estimation model of inflation and fiscal deficit, with a view to testing causes and effects as well as the relationship between them. The estimation technique used is the autoregressive distributed lag (ARDL) model and the Granger-causality tests. Result of the Granger-causality test revealed that the conjuncture that fiscal deficit does not cause inflation be rejected judging from the fact that the result indicates a significant causal link flowing from fiscal deficits to inflation spirals at less than 5 percent probability value. This suggests that fiscal deficits cause inflation in Nigeria. From his results of the ARDL test, it was observed that there exists a significant negative correlation between growth in fiscal deficit and innovations in the rate of inflation which is in conformity with expectation. Abstracting from the results, the study recommended that policies targeted at inflationary control in Nigeria may be most effective if they are targeted at reduction in fiscal deficits and by extension, government should support growth in the real sectors of the economy.

A study by Ezirim and Muoghalu (2006), suggests that the magnitude of government size as a proportion of gross domestic product (GDP) reflects the level of taxation in the economy. They were of the view that when the size of the public sector (measured by the share of expenditure on GDP) exceeds a certain threshold, incentives to produce are discouraged

(because of high tax burden). According to them, this will lead reduction in aggregate supply, scarcity of goods and services making for excess of demand over supply. The net effect of such a bad adjustment between demand and supply is an inflationary spiral.

Muhammad & Attiya (2013) explores the relationship among the rate of inflation, economic growth and government expenditure in case of Pakistan. They decomposed the government expenditure into government current expenditure and the government development expenditure and employed time series data for the period of 1980-2010 in the analysis. Econometrics tools such as Augmented Dickey Fuller (ADF) unit root test, Autoregressive Distributed Lag (ARDL) model, Johansen cointegration and Granger-causality tests were used to gauge such relationships. The outcome of the estimations identified a long term relationship amongst rate of inflation, economic growth and government expenditure; it means that government expenditures yield positive externalities and linkages. The results further revealed that in the short run time frame, inflation rate is found not to affect economic growth but rather government expenditures is found to have link with economic growth. The causality test results suggest that inflation rate cause economic growth with government expenditure also causing economic growth in Pakistan.

Everton, Vincent & Wilson (2012) employed a modeling approach that incorporates the theory of cointegration and its implied vector error correction model, to investigate the long term relationship between fiscal deficits and inflation for Nigeria, a country which has experienced very large fluctuations in the government fiscal deficits. The empirical results show that there is a positive but insignificant relationship between fiscal deficits and inflation. This inconsequential nature of the positive relationship between budget deficits and the inflation rate may result from the fact that most a time fiscal deficits represent insignificant proportion public expenditure which in several studies have been found to granger cause inflation rate. The analysis of the Nigerian data also indicate a tenuous link to previous levels of fiscal deficits with inflation and provide, moreover, evidence of a positive long-run relationship between money supply growth and inflation, suggesting therefore that money supply growth is pro-cyclical and tends to grow at a faster rate than the rate of inflation. Finally, from the impulse response and variance decomposition analysis, the study finds that the length of inflation is an important determinant of the ability of the system to return to its long-run equilibrium following a shock.

In the same, Medee, & Nenbee (2012) examined fiscal deficits and inflation in Nigeria for the period of 30 years running from 1980 to 2010 tended at ascertaining the nature of the relationships among inflation rate, interest rate and fiscal deficits. They employed the Ordinary Least Square (OLS) estimation technique of multiple regressions in presenting the econometric analysis of the study. The results showed that both inflation rates and interest rates were rightly

signed with fiscal deficits. Despite this theoretical congruence, inflation rates impacted on fiscal deficits while interest rate does not. The authors were of the opinion that the inability of interest rates to impact on fiscal deficits perhaps could be blamed on unstable macroeconomic policy environment, corruption, and more. To this extent, they then, suggested that there is need to reorder Nigeria's fiscal policy priorities based on sincerity so as to rebuild confidence in the economy. On the basis of the results the authors concluded that the current inflation targeting policy regime, if any, should be implemented based on fiscal discipline, financial sector stability as well as a reliable model for data computation of inflation. However the modeling approach of the study where fiscal deficit is specified as a function of inflation rate and interest rate is viewed with reservation. This stems from the fact that, the existence of a significant positive correlation between interest rates and prices has been confirmed by erudite economic scholars (see, Tooke, 1844, Gibson, 1923, Keynes, 1930, Kitchin 1923, Peake, 1928). In effect, the independence of the explanatory variables cannot be vouched and to this extent the estimation of the model may be frosted with or may not be absorbed of the problems of multi-colinearity, positive autocorrelation and misspecification. This must have accounted for the low value R^2 of 0.28 and meager DW static of 1.27.

Amir et al (2010) examines the causal relationship among government size, inflation and economic growth for the period (1959-2007) in Iran. To test for the suitability of the employed variable for the purposes intended, phillips-perron unit root test procedure was adopted for this study. The results of the phillips-perron unit root test indicate that the three variables of interest become stationary after differencing for one period which in effect suggests that the variables are integrated of order one 1(1). The benchmark results indicate: (a) Existence of long-run relationship among the variables as affirmed by cointegration test. (b) There is no causality relationship between government size and GDP growth and negative unidirectional causality running from economic growth to inflation were indicated by VEC model estimation. Another result of the study shows that a decline in the government size may lead to low inflation without any pressure on economic growth. The goal of most empirical studies in econometrics and other social sciences is to determine whether a change in one variable causes a change in or helps to predict another variable (Awe, 2008). To this extent, I am of the view that using variations or developments in the employed variable may provide more precise prediction of the dependent variables by the explanatory variables. In effect, the use of the absolute values of these variables in the estimations by the authors of this study must have left the results of the estimations or analysis tinted especially as no evidence of post estimation tests for stability of the model, positive autocorrelation and misspecification as CUSUM and LM tests was present.

Most of the empirical studies reviewed in the course of this study, investigating the existence of causal relationship between rate of inflation and government size were tested on developed economies. To this extent, the author of this current study intends to replicate same in a developing economy like Nigeria at least for comparative consideration. In the same vein, most of the empirical reviews with respect to Nigeria economy were centered on the relationship between fiscal deficits and the rate of inflation. This to the author would only amount to partial estimation of public expenditure-inflation rate relationship thus painting partial picture of such an all important correlation. My fear is a function of the fact that most a times, budget deficits may constitute an insignificant proportion of gross public expenditure and therefore will not present a through and fair view of the extent to which government size can fuel inflation rate in Nigeria. Generally, all the empirical studies reviewed and documented here used the absolute values of the variables within the period under review in investigating the causality. The goal of most empirical studies in econometrics and other social sciences is to determine whether a change in one variable causes a change in or helps to predict another variable (Awe, 2008). To this extent, this study makes use of variations or developments in the employed variable for the econometric analysis to provide more precise prediction of the dependent variables by the explanatory variables. Finally, as never experienced in any of the studies reviewed above, this study decomposes public expenditure in Nigeria into four major sectors in search of more robust and informed fiscal policy decisions. All the above observations may have provided enough and substantial gap to serve as motivation this study.

METHODOLOGY

This study is founded on Causal Comparative or *Ex Post Facto* Research Design bearing in mind that the study attempts to explore cause and affect relationships where causes already exist and cannot be manipulated. The study used what already exist and look backwards to explain why. We seek to establish the causal relationship between inflation rate and government size putting into perspective Nigeria economy. To achieve these fits, we opted to deploy the relevant variables as follows: inflation rate (INFRATE) as the explained variable, and government size (GOVTSIZE) decomposed into four subsectors of administration (ADMIN), social and community services (SOCOS) economic services (ECONS) and transfers (TRFS) as explanatory variables. GOVTSIZE means government expenditure as a percentage of GDP. Annual data for the periods of 1981 to 2013 are sourced from the Central Bank of Nigeria (CBN) statistical bulletin for 2013 published in 2014. The paper employs vector error correction modeling, cointegration procedure, and causality tests to investigate the short run as well as long run causal relationships between inflation and public expenditure growth in Nigeria.

Developments or variations in the data series employed expressed in percentage form are deployed in the estimation. The latest analytical econometric application package software such as E-View 7.0 is used frequently during the study.

Model Specification

Plethora of studies has established the fact that government size growth significantly fuels the rate of inflation for both developed and developing economies (see Cosimo, 2011, Ezirim et al, 2008, Song & Casey, 2008, Ezirim & Muoghalu, 2006, Muhammad & Attiya, 2013, and Olaiya et al amongst others). Here, the annual data on inflation spiral and government size for Nigeria for the period of 1981 – 2013 are employed. The annual data on government size is decomposed into the four major sectors or channels of government expenditures with the time series value for each sector expressed as a percentage/proportion of GDP. To this extent we employ a modeling approach that expresses inflation rate as a function of the decomposed government size of, administration, social and community services, economic services and transfers as follows:

INFRATE = (ADMIN, SCSERV, ECOSER, TRFS) (1)

For the purpose of estimation, the above functional notation is expressed in multivariate linear model with intercept as follows:

$$INFRATE_t = \beta_0 + \beta_1 ADMIN_t + \beta_2 SCSERV_t + \beta_3 ECOSER_t + \beta_4 TRFS_t + \mu_t \quad (2)$$

Where: INFRATE = inflation rate, ADMIN = administration, SCSERV = social and community services, ECOSER = economic services and TRFS = transfers. β_0 is the constant term, $\beta_1 \ldots \beta_4$ are the explanatory powers of the explanatory variables, t, is the time trend and μ is the stochastic error term. In order to analyze the extent of the causal link between government size as decomposed and inflation, we adopt the VAR modeling approach of (Amir et al., 2010). They employed vector error correction (VEC 3, 2) model to test for the presence and the direction of causal relationship among the three macroeconomic variables of inflation, GDP growth and government size (in their aggregate values) for Iran. For this study we effect some modifications such as omitting the GDP growth variable, decomposing government expenditure as proportion of GDP into four major channels of public spending as identified above and taking the percentage variations in them. Optimal lag length selection criteria suggest 2 (two) lags for both Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) being guided by the lag length which yields the smallest value for our information criterion, which brings our modified model to VEC (5, 2). Equations (1-2) above were intended just to predict the linear function of

the employed variables, but for the purpose of investigating the short and long run causal links between consumer price index and government size as decomposed by sectors, system equation in VEC environment was specified as below:

D(LCPI)=C(1)*(LCPI(-1)+3905.67289391*LADMIN_GDP(-1)-11524.236708*LSCSERV_GDP(-1)+1443.19726024*LECOSERV_GDP(-1) + 1526.9975733*LTRANS_GDP(-1) -108.380704173) + C(2)*D(LCPI(-1)) + C(3)*D(LCPI(-2))+C(4)*D(LADMIN_GDP(-1))+C(5)*D(LADMIN_GDP(-2))+C(6)*D(LSCSERV_GDP(-1)) + C(7)*D(LSCSERV_GDP(-2))+C(8)*D(LECOSERV_GDP(-1))+C(9)*D(LECOSERV_GDP(-2)) + C(10)*D(LTRANS_GDP(-1)) + C(11)*D(LTRANS_GDP(-2)) + C(12) (3)

Where, C(1) is the coefficient of error correction term and speed of adjustment, C(2) …C(11) are short run coefficients and C(12) the constant. LCPI is the log of consumer price index, while LADMIN_GDP, LSCSERV_GDP, LECOSERV_GDP and LTRANS_GDP are the logs of the ratios of public expenditure on administration, social and community service, economic services and transfers respectively to GDP, while L indicates Logarithm.

Decision Rules

This is evaluated to determine the extent to which government size, as decomposed, jointly and significantly cause consumer price index in the long run. The system equation is estimated using Least Square method and result interpretation to be guided as follows:

(1) The C (1) $_{is}$ the long run coefficient of EC (-1). Then for long run causality to be established, the value of C(1) must be negative and statistically significant at 5 percent margin of error,

(2) Then C(2),…, C(10) are the short run coefficients of the independent variables.

We evaluate these short run coefficients for short run causality running from the decomposed government size by sectors to consumer price index using Wald Test through coefficient diagnostic and restriction approach. If:

C(4)=C(5)=0, suggests that increase in government expenditure on administration does not cause increase in consumer price index in the short run.

C(6)=C(7)=0, suggests that increase in government expenditure on social and community service does not cause increase in consumer price index.

C(8)=C(9)=0, means that increase in government expenditure on economic services does not cause increase in consumer price index in the short run.

C(10)=C(11)=0 indicates that there is no short run causality between government expenditure on transfers and consumer price index.

Here, we describe the variables employed in the study. Consumer price index (CPI) is used to proxy inflation spiral. Government expenditure on administration (ADMIN) represents public expenditure on general Administration, Defense, Internal security and National Assembly. Public expenditure on Social and Community Services (SCSERV) constitute government expenditures on Education, Health and other social and community services. Expenses on Economic Services (ECOSERV) means public expenditures on Agriculture, Construction, Transport & Communication and other economic services, with public expenditure on Transfers (TRANS) meaning government spending on Public debt servicing, Pensions and gratuity, Contigencies/subventions and Other/Other CFR charges.

Estimation Procedure

For the purpose of diagnosing the employed variables for fitness and suitability for purposes intended, E-view 7.0 econometric application package (software) was used to gauge the data for stationarility or otherwise, employing the Augmented Dickey-Fuller and Phillip Peron (PP) tests procedures. Whether long run relationship exists or otherwise, among the choice variables is checked using co-integration analysis. Finally we ran granger non- causality test to establish the direction of flow of influence between the explained and explanatory variables. Cosimo (2011), the non-stationary series with the same order of integration may be cointegrated if there exist some linear combination of the series that can be tested for stationarity. The Johansen and Juselius procedure (Johansen, 1988; Johansen and Juselius, 1990) is preferable to test for cointegration for more than two series. Moreover, Johansen and Juselius procedure is considered better than Engle-Granger even in two time series case and has better small sample properties since it allows feedback effects among the variables under investigation, where it is assumed in the Engle and Granger procedure that there are no feedback effects between the variables. The procedure is based on likelihood ratio (LR) test to determine the number of co-integration vectors in the regression. Johansen technique enables us to test for the existence of non-unique Co-integration relationships.

EMPIRICAL RESULTS

Data analysis and interpretation is intended to transform the data collected into credible evidence about the development of the intervention. Data analysis involves working to uncover patterns and trends in data sets while interpretation involves explaining those patterns and trends. Data analysis is considered an important step and heart of the research in any research work. When data has been collected with the assistance of relevant tools and methods, the next

logical step, is to analyze and interpret the data with a view to arriving at empirical solution to the problem.

Correlogram

We used this environment to verify the characteristics of the variables employed for the study by gauging the levels of integration. Correlogram test was implemented for each of the variables of LCP1, Ladmin_GDP, LSCServ_GDP, Lecoserv_GDP and Ltrans_GDP, for logs of consumer price index, the ratios of government expenditure on administration to GDP, Social and Community services to GDP, Economic services to GDP and transfers to GDP respectively. For each of the correlogram test to determine the status of the variable in terms of stationarity, lag length of 16 was implemented and the value of Q-statistic and their corresponding P-value at lag 16 were read. At level, the P-values for all the variable were less than the 5 percent critical level. This means that we accept the null hypothesis, which posits that the variable of interest is not stationary at level. When the same process was followed to gauge the stationary level for each of variables of interest at first difference, the P-values of the Q-statistic at lag 16 show that in all the instances, the P-value was higher than 5 percent significant level excepting for log of consumer price index which was stationary at second difference. Therefore, results of correlogram used to test the series statistics, not presented here, affirm to the fact that in all cases, the variables at least unit root, meaning that the variables are suitable for the purpose intended.

Testing for Cointegration

It is frequently of interest to test whether a set of variables are co-integrated. This may be desired because economic implications such as whether some systems are in equilibrium in the long run or rather, it may appear sensible to test such hypothesis before estimating a multivariate dynamic model (Engle & Granger, 1987). With stationarity confirmed for the entire employed variable at first difference 1(1), excepting for the consumer price index (CPI) that is stationary at 2^{nd} difference. We are motivated to test for cointegration among the variables to determine the number of Cointegrating equation, and hence gauge if there exist any long-run equilibrium relationship between the explained and explanatory variables. There are several methods (ordinary least squares, nonlinear least squares, maximum likelihood in an error correction model, principal components, and canonical correlations) of estimating cointegrating vectors, but examining the asymptotic distribution of the estimators resulting from these methods shows that maximum likelihood in a fully specified error correction model (Johansen's approach) has clearly better properties than the other estimators (Gonzalo, 1994). To this effect,

Trace and maximum eigenevalue approach by Johansen (1991, 1995) were preferred and implemented. In the both instances the results indicate one Cointegrating equation, meaning that all the variable share single error term, or that all the variables of LCPI, LADMIN_GDP, LSCSERV_GDP, LECOSERV_GDP and LTRANS_GDP share long run associationship. This by implication suggests that there is a long-run steady state equilibrium relationship existing between the dependent and the independent variables. The results are presented in tables 2 & 3 below.

Table 1: Trace Test for Cointegration

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical value	Prob**
None*	0.7494	82.297	69.818	0.0036
At most 1	0.4555	40.777	47.856	0.1959
At most 2	0.4121	22.535	29.797	0.2696
At most 3	0.1730	6.596	15.494	0.6250
At most 4	0.0294	0.897	3.841	0.3434

Table 2: Maximum EigenvalueTest for Cointegration

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical value	Prob**
None*	0.7494	41.519	33.876	0.0051
At most 1	0.4555	18.242	27.584	0.4751
At most 2	0.4121	15.939	21.131	0.2284
At most 3	0.1730	5.698	14.264	0.6522
At most 4	0.0294	0.897	3.841	0.3434

Notes: (i) Cointegration tests performed using Eview 7.0

(ii) both Trace and Max-Eigen tests indicate 1 cointegrating equations at the 0.05 level

*(iii) * denotes rejection of the null hypothesis at the 0.05 level*

Table 3: Estimates of Long-Run Co-integrating Vectors (Linearised)

LCPI	LADMIN_GDP	LSCSERV_GDP	LECOSERV_GDP	LTRANS_GDP
1.000000	3905.673	-15524.24	1443.197	1526.998
	(1051.15)	(2153.17)	(364.827)	(316.854)

Notes: 1. Figures in parentheses indicate standard errors.

2. The long run equilibrium relation is:

LCPI = 3905.673LADMIN_GDP – 11524.24LSCSERV_GDP + 1443.197LECOSERV_GDP + 1526.998LTRANS_GDP

All the long run coefficients of the estimated model as are statistically significant as exhibited by the long-run cointegrating vectors as expressed above.

Furthermore, evidence from the long run equilibrium relation suggests that excepting for the ratio of public expenditures on social and community services to GDP, all the other components of public expenditure GDP ratios are positively related with consumer price index (CPI) in the long run time horizon. This by implication signifies that consumer price index and government expenditures on economic services (ECOSERV), administration (ADMIN) and transfers trend together on a positive notes in the long run, while public expenditures on social and community services (SCSERV) share negative association with consumer price index in the same time horizon. This is neither abnormal nor leaves cause for concern for a developing economy like Nigeria with very high level of unemployment and substantial low level of average installed manufacturing capacity utilization (AIMCU).

Testing for Long-run and Short run Causality in the VECM Environment

Testing for Long-run Causality

Table 4: Least Square Estimation of System Equation

Dependent Variable: D(LCPI)
Method of Least Square
Included observations: 30 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.014617	0.016669	0.876879	0.3921
C(2)	0.770504	0.251389	3.064988	0.0067
C(3)	0.095243	0.259889	0.366476	0.7183
C(4)	0.355437	87.31400	0.004071	0.9968
C(5)	-0.049603	93.80084	-0.000529	0.9996
C(6)	109.2831	150.7290	0.725031	0.4778
C(7)	119.9015	131.0891	0.914657	0.3725
C(8)	-67.96378	52.63503	-1.291227	0.2130
C(9)	-26.34242	42.27395	-0.623136	0.5410
C(10)	-12.83653	33.38631	-0.384485	0.7051
C(11)	14.40685	28.37673	0.507700	0.6178
C(12)	0.924354	0.834264	1.107987	0.2825

R-squared	0.809812	Mean dependent var	4.475646
Adjusted R-squared	0.693586	S.D. dependent var	4.055926
S.E. of regression	2.245143	Akaike info criterion	4.744590
Sum squared resid	90.73205	Schwarz criterion	5.305069
Log likelihood	-59.16885	Hannan-Quinn criter.	4.923892
F-statistic	6.967570	Durbin-Watson stat	2.009618
Prob(F-statistic)	0.000171		

The identification of a co-integrating vector among the variables, advised us to develop and implement vector error correction model (VECM) to investigate if there exist any significant long-run and/or short-run causal relationship between the dependent and independent variables. The guiding objective of this study is the evaluation of the direction of the causal relationship between consumer price index and sectorally decomposed government size. To achieve this fit, we develop system equation from the restricted VAR estimate of the target equation and estimate same in the least square environment to obtain the values of both long-run and short-run coefficients with their respective P-values. To establish the existence or otherwise of long-run and/or short run causalities and observe the long run and short run coefficient values from the least square estimations. The coefficient value of the error term lagged one period EC(-1) is used to gauge if government size as decomposed by sector jointly and significantly cause consumer price index in the long run. For this to be affirmed, the coefficient of EC (-1) must be negative and at the same time statistically significant. The results of the least square estimation of the VEC model as presented in table 5 above, show that the coefficient and (probability value) of the error correction term, C (1) are 0.014617 (0.3921) respectively. These suggest that the condition precedent for confirmation of causality in the long run is violated as the coefficient of error correction term is positive and the p-value of 39.21 percent is higher than the 5 percent significant level, meaning that we cannot reject the null hypothesis, which states that there is no long run causality running from government size as decomposed by sector to consumer price index in Nigeria. On the above note, we declare that for Nigeria, public spending on administration, social and community services, economic services and transfers as ratios of GDP jointly do not influence consumer price index on the long run.

Testing for Short run Causality

To gauge for the extent to which short-run causal relationship exists between consumer price index (CPI) and government size as decomposed by sectors, we implement the Wald test through Coefficient diagnostic and restriction to test the null hypotheses which state that the value of the coefficient of each variable and its lags, jointly are not significantly different from zero, meaning that there is no short-run causality between that variable and the dependent variable within the period under review. This test is performed on each of the independent variables and our decision guided by the Chi-square values and the corresponding p-values. High p-value above the 5 percent significant level advises us not to reject the null hypothesis and low p-value below the 5 percent significant level advises us to reject the null hypothesis. At this point, we use WALD test developed by Toda and Yamamoto (1995) and Dolado & Lütkepohl (1996) to implement linear coefficient restriction to establish whether or not causality

runs from any of the independent variables to the dependent variable. The results of the WALD tests for causality as presented in tables 6 to 9 below indicate as follows: (i) LADMIN_GDP(-1) and LADMIN_GDP(-2) jointly do not influence the consumer price index. (ii) The Chi-Square value of 0.923948(0.6300) with the figure in bracket indicating the P-value, means that we cannot reject the null hypothesis that LSCSERV_GDP (-1) and LSCSERV_GDP (-2) jointly cannot cause consumer price index in Nigeria. (iii) With the Chi-Square (P-value) of 1.684034(0.4308) respectively, we cannot reject the null hypothesis that LECOSERV_GDP(-1) and LECOSERV_GDP(-2) jointly do not cause consumer price index within the period under review. (iv) Finally, the Chi-Square (P-value) of 0.629969(0.7298) respectively suggests that we cannot reject the null hypothesis, meaning that LTRANS-GDP(-1) and LTRANS_GDP(-2) jointly cannot influence consumer price index in Nigeria. The above results, suggest that there is no short run causality running from government size as decomposed to consumer price index.

Table 5: Wald Test

For Equation**:** C(4)D(LADMIN-GDP(-1))=C(5)D(LADMIN-GDP(-2))=0

Test Statistic	Value	df	Probability
F-statistic	1.11E-05	(2, 18)	1.0000
Chi-square	2.22E-05	2	1.0000
NULL Hypothesis: C(4)=C(5)=0			
NULL Hypothesis Summary:			
Normalized Restriction (0)		Value	Std. Err
C(4)		.355437	87.31400
C(5)		-049603	93.80084

Table 6: Wald Test

For Equation: C(6)D(LSCSERV-GDP(-1))=C(7)D(SCSERV-GDP(-2))=0

Test Statistic	Value	df	Probability
F-statistic	0.461974	(2, 18)	0.6373
Chi-square	0.923948	2	0.6300
NULL Hypothesis: C(4)=C(5)=0			
NULL Hypothesis Summary:			
Normalized Restriction (0)		Value	Std. Err
C(6)		109.2831	150.7290
C(7)		119.9015	131.0891

Table 7: Wald Test

For Equation: C(8)D(LECOSERV-GDP(-1))=C(9)D(ECOSERV-GDP(-2))=0			
Test Statistic	Value	df	Probability
F-statistic	0.842017	(2, 18)	0.4471
Chi-square	1.684034	2	0.4308
NULL Hypothesis: C(4)=C(5)=0			
NULL Hypothesis Summary:			
Normalized Restriction (0)		Value	Std. Err
C(8)		-67.96378	87.31400
C(9)		-26.34242	93.80084

Table 8: Wald Test

For Equation: C(10)D(LTRANS-GDP(-1))=C(11)D(LTRANS-GDP(-2))=0			
Test Statistic	Value	df	Probability
F-statistic	0.314984	(2, 18)	0.7337
Chi-square	0.629969	2	0.7298
NULL Hypothesis: C(4)=C(5)=0			
NULL Hypothesis Summary:			
Normalized Restriction (0)		Value	Std. Err
C(10)		-12.83653	33.86631
C(11)		14.40685	28.37673

Discussion of Results

This section is dedicated to evaluation of the results of the data analysis in confirming or failing to reject the null hypothesis as reported. This is done in terms of the dispositions of the theories guiding the study and relevant documented extant empirical literature. Summary of this model estimation indicate that: (1) Evidence from the cointegration test shows that LCPI, LADMIN_GDP, LSCSERV_GDP, LECOSERV_GDP and LTRANS_GDP share long run associationship on the positive note, excepting for expenditure on the social and community services (LSCSERV_GDP) which is negatively signed. This means that, in the long run, when government expenditure on administration, economic services and transfers, severally goes up, consumer price index goes up and when government expenditure on social and community service sector goes up, in the long run, consumer price index goes down. (2) The independent variables of LADMIN_GDP, LSCSERV_GDP, LECOSERV_GDP and LTRANS_GDP jointly do not cause consumer price index (LCPI) in the long run, meaning that, in the long run, developments in the independent variables cannot explain the variations in the dependent variable in this model. (3) Finally, no evidence of short run causality running from each of the

independent variables to the dependent variable was identified in this model, meaning that even in the short run, public expenditures on administration, social and community service, economic services and transfers, severally cannot influence consumer price index.

The results of the estimations appear to be mixed and contradicting and leave us with no other option than to reflect in the concept of exegeneity in statistical or econometric modeling. In any modeling approach, there are two sides to the issue of exegeneity: (1) Variable or factor exogenous in the model which refers to the independent variable identified within the structure of the model. (2) Variables or factors exogenous to the model which refers to variables relevant to the model but is out of the model (omitted in the specification), may be because of their nature (qualitative etc). The fact that *ceteris is never paribus* in practice; the two categories of exogenous variables may jointly or severally explain developments in dependent variable of a model. Reviewing the overall results of the study in terms of the identified cointegrating equation and the granger non causality tests, suggest that developments in the exogenous factors or variables outside the model rather those in the model, have dominated in explaining or causing developments in the consumer price index within the period under investigation.

Furthermore, for economics, all different variables affect the same variable simultaneously as repeated experiments under control are infeasible. To this extent the two most difficult challenges are that: (1) Correlation does not imply causality and distinguishing between these two is by no means an easy task. (2) There always exists the possibility of ignored common factors and the causal relationship among variables might disappear when the previously ignored common causes are considered (Jin-Lung, 2008).Granger representation theorem by Engle & Granger (1987) and Johansen (1991) postulates that “existence of co-integration implies that granger causality must exist in at least one direction between the variables of the system”. These results contradict this theorem because despite the fact that 1 co-integrating vector was identified with all the long run coefficients statistically significant, neither evidence of short run or long run granger non causality between the dependent and independent variables is identified, meaning the developments in the consumer price index is a function exogenous variables or factor outside the estimation model. This may include the exchange rate of the domestic currency, the Naira, to the United States Dollars (Ogbonna, 2009, 2010). In the both instances, evidence from the studies, identified exchange rate as a singular most promising macroeconomic fundamental for both internal and external balance adjustments. Other studies such as Dakurah et al., 2001, Abizadeh & Yousefi, 1998 also failed to identify any significant association between public expenditure growth and consumer price index.

Furthermore, the P-value of LCPI(-1) coefficient of 0.0067 which is far below the significant value of 5 percent, suggests that developments in consumer price index in Nigeria is a function of its previous period values and exchange rate of the domestic currency to the United States dollar. The efficacy of broad money supply may have been neutralizes by the ever high lending rate which always leaves the deposit money banks with excess liquidity. In effect, the much touted assumption by policy makers that government size, particularly the cost of governance cause inflation as proxied by consumer price index is not supported by the enquiry, but rather the value of inflation in the previous period (inflationary expectations), exchange rate of the domestic currency to the US dollar and other relevant exogenous factors outside the estimated model significantly influence developments in consumer price index in Nigeria.

To vouch for the reliability and avoid dwelling on dubious results for decision or opinion, relevant diagnostic tests were implemented and the results indicate as following: The result of normalcy test of Jarque-Bera coefficient of 0.651808(0.721875) with the figure in bracket indicating the P-value, suggests that the null hypothesis which states residuals are normally distributed cannot be rejected, meaning that the residuals of the estimated equations are normally distributed. The result of the Breusch-Godfrey (LM) test for serial correlation, show Chi-Square probability value of 0.3562, suggesting non rejection of the null hypothesis of no serial correction, meaning that our model is not characterized by serial correlation. This assertion is further supported by the value of the Durbin-Watson statistic of 2.009618. Equally, we implemented ARCH model estimation to test for heteroscedasticity effect on our system equation. The result of Obs*R-square value of 4.273296 and Prob. Chi-Square(1) value 0.0387 suggests the rejection of the null hypothesis of heteroscedasticity effect on the model, meaning that there is no heteroskedasticity effect on the estimated regression equation. Finally, the stability of the model is verified with the recursive residual wandering within the 5 percent critical lines in the CUSUM test for equation stability. With all these confirmatory tests, the suitability and validity of the estimation regression model is established, meaning that the results of the estimation model can be relied upon for relevant policy decisions.

CONCLUDING REMARKS

This paper employs autoregressive modeling, cointegration procedure, and causality tests to investigate the relationships between public expenditure as decomposed by sector and inflation in Nigeria. The unit roots test indicates that the variables were relatively stationary when transformed into rates of change. Results of correlogram used to test for stationary level, affirm to the fact that in all cases, the variables become stationary at least in their first difference, meaning that the variables are suitable for the purpose intended. The results further indicate

that: (i) Long run equilibrium relationship exist between consumer price index and the decomposed government size in Nigeria, with all the long run coefficients statistically significant. (ii) No long run causal relationship was identified between consumer price index and the decomposed government expenditure within the period under investigation, meaning that for Nigeria, public spending on administration, social and community services, economic services and transfers as ratios of GDP jointly do not influence consumer price index on the long run. (iii) There is no short run causality running from LADMIN_GDP, LSCSERV_GDP, LECOSERV_GDP or LTRANS_GDP to the dependent variable (LCPI), meaning that government sectoral expenditures on administration, social and community services, economic services and transfers, severally do not influence consumer price index in the short-run in Nigeria. The above results present some policy implications that government of Nigeria cannot comfortably regulate the levels of inflation in the economy with controlling the levels of its expenditures. This suggests that fiscal policy in the form of government expenditure should not be intended to moderate developments in consumer price index, rather, Policy measures designed to ensure effective and appropriate pricing of the domestic currency should be put in place for effective moderation of inflation in Nigeria.

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